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THE
AMERICAN CYCLOPÆDIA.

VOL. XIV.
PRIOR-SHOE.

THE
AMERICAN CYCLOPÆDIA:

A

Popular Dictionary

OF

GENERAL KNOWLEDGE.

EDITED BY

GEORGE RIPLEY AND CHARLES A. DANA.

WITH SUPPLEMENT.

VOLUME XIV.

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AMERICAN CYCLOPÆDIA.

PRIOR

PRIOR, Matthew, an English poet, born at Wimborne-Minster, Dorsetshire, July 21, 1664, died at Wimpole, Cambridgeshire, a seat of Lord Oxford, Sept. 18, 1721. He graduated at Cambridge in 1686. Here he formed an intimacy with Charles Montague, afterward earl of Halifax, with whom he wrote "The City Mouse and Country Mouse" (1687), in ridicule of Dryden's "Hind and Panther." He was appointed in 1690 secretary of the embassy at the Hague, and became one of the gentlemen of the bedchamber to William III. In 1695 he wrote an ode on the death of Queen Mary. In 1697 he was appointed secretary of the commissioners who concluded the treaty of Ryswick, and in 1698 secretary of the embassy at the court of France. In 1699 he was made under secretary of state, but losing his place shortly after, received in 1700 the appointment of commissioner of trade. The same year he published his *Carmen Seculare*, a panegyric on King William. In 1701 he was elected a member of parliament from East Grinstead, and soon after he changed his politics, becoming a violent tory. In 1711 he was sent on a private mission to Paris with proposals of peace. Bolingbroke went to Paris as ambassador to hasten the negotiations; and Prior, who was in company with him, after Bolingbroke's return became the ambassador. When, in August, 1714, the whigs had regained office, Prior was recalled, and was at once arrested on a charge of treason. While a prisoner in his own house for two years he wrote "Alma, or the Progress of the Mind." After his release he published his poems by subscription, through which he realized 4,000 guineas. Lord Harley, son of the earl of Oxford, added an equal sum for the purchase of Down hall in Essex, which was settled upon Prior for his life. He was buried in Westminster abbey, and a monument was erected to his memory,

PRISCILLIAN

for which he left £500 in his will. The best of the old editions of his poems is that of 1791 (2 vols. 8vo). An edition with a life by Mitford (2 vols. 12mo) was published in 1835.

PRISCIANUS, a Roman grammarian, who lived about A. D. 500, and is supposed from his surname Cæsariensis to have been born or educated at Cæsarea. He was a pupil of Theodistus, and taught grammar at Constantinople, was in receipt of a salary from the government, and was probably a Christian. His *Commentariorum Grammaticorum Libri XVIII* contains a large number of quotations from Greek and Latin writers not otherwise known, and a parallel between the Greek and Latin languages. He also wrote a "Grammatical Catechism on twelve Lines of the *Æneid*," a "Treatise on Accents," one on "The Metres of Terence," some short poems, and several translations from the Greek; and the acrostics prefixed to the plays of Plautus are ascribed to him. His name is familiar in the phrase *diminuere Prisciani caput* (to break Priscian's head), commonly applied to those who use false Latin.

PRISCILLIAN, the founder of a religious sect in Spain and Gaul, born in the neighborhood of Cordova, died in Treves in 385. He was of high birth, and possessed wide learning and great rhetorical talents. It is said that he was instructed by a certain Egyptian called Mark, and by Elpidius and Agape. He appeared as a religious reformer with the pretension of having been called to preach the true doctrine and a spiritual asceticism, and to found within the Catholic church a special secret society of initiated and saints. He was excommunicated by a synod held at Saragossa about 380, but to no effect, as he was soon after ordained bishop of Ávila. The emperor Gratian was thereupon persuaded to publish an edict exiling Priscillian and his friends, but a revocation of the edict

was obtained by bribing some of the court officials. Another synod, held at the instance of Bishop Ithacius at Bordeaux in 384, when Maximus had usurped the throne, again gave an adverse decision. Priscillian appealed before the emperor, who sentenced him to death and decreed the confiscation of his property. Priscillian's execution is the first instance of a Christian condemned to death for heresy. The doctrines held by the Priscillianists were a mixture of Manichæism and Gnosticism.

PRISM, in geometry, a solid bounded by plane faces, of which two that are opposite are equal, similar, and parallel, and are called the bases of the prism; the other surfaces are parallelograms. The axis is the line connecting the centres of the bases. The prism is triangular, square, pentagonal, and so on, according as the figure of the bases is triangular, square, pentagonal, &c. It is right or oblique according as the sides are perpendicular or oblique to the bases. A right prism is regular when its bases have the figure of a regular polygon. The prism corresponds among bodies with plane surfaces to the cylinder among bodies with curve surfaces.—In optics, a prism is a portion of a refracting medium bounded by two plane surfaces inclined to one another. The line in which these two surfaces meet, or would meet if produced, is the edge of the prism; their inclination is called its refracting angle. The form commonly used is a triangular prism of glass. A good contrivance for delicate experiments may be made with two rectangular pieces of plate glass firmly set to form two sides of a triangular box which is to be filled with water or spirits of turpentine. The prism is essential in apparatus for decomposing light.

PRISONS AND PRISON DISCIPLINE. Penitentiary science, or the system of detaining, punishing, and reforming criminals, is of modern origin. The Scriptures contain references to prison houses and to the punishment of offenders. In Greece and Rome punishments were inflicted by loss of caste, of citizenship, and of liberty, banishment, and penal labor, which was sometimes performed on public works, in quarries, mines, &c. In the Roman empire there were houses, called *ergastula*, used chiefly for the punishment of criminal and refractory slaves. In Rome there still remains a prison, known as the Mamertine caves, consisting of several vaults or apartments. (See *ROME*, vol. xiv., p. 411.) The feudal barons had towers in their castles called *donjons*, whence is derived dungeon, for the confinement of their captive foes or refractory retainers. Sometimes the prison vaults were cut in the solid rock below the surface of the earth.—A movement for the amelioration of the wretched condition of English prisons and prisoners was begun by John Howard, whose investigations led to the enactment of two laws by parliament in 1774, one abolishing prison fees (which up to that time had been exacted from all prisoners) and the protracted

confinement of the prisoner until these were paid, the other providing for an improvement of the sanitary condition of jails. In 1777 appeared the first work of Howard on prisons, "The State of the Prisons in England and Wales." The works of Beccaria on crime and punishment appeared about the same time on the continent; and in England Sir William Blackstone, Mr. Bentham, and Mr. Eden entered upon the work of prison reform in earnest. The prisons were found to be in the most wretched condition, while the treatment to which the prisoners were subjected was demoralizing in the highest degree. In 1776 a prison was built at Horsham by the duke of Richmond under Howard's advice and coöperation, and was a marked improvement upon any prison then existing. In 1778 an act for the establishment of penitentiary houses was passed through the efforts of Howard, Eden, and Blackstone. The leading principles of the new system were that "if any offenders convicted of crimes for which transportation has been usually inflicted were ordered to solitary imprisonment, accompanied by well regulated labor and religious instruction, it might be the means under Providence, not only of deterring others, but also of reforming the individuals and turning them to habits of industry." There was much delay in carrying out the proposed reforms. In 1791 Jeremy Bentham published his "Panopticon, or the Inspection House," containing a plan for a model prison; but it was not till 1821 that the great penitentiary at Millbank on his model was completed, though it had been opened in 1817. It comprised six pentagonal structures radiating like the spokes of a wheel from a central hexagon, from which all the cells were visible. This prison was torn down in 1875. In 1842 was opened the cellular prison at Pentonville. Government convict prisons have also been established at Brixton, Portland, Chatham, Portsmouth, Parkhurst, Dartmoor, and Woking. The convict prison at Fulham is exclusively for females, who are also sent to Woking. Early in the present century Mrs. Elizabeth Fry commenced her mission to the female prisoners in Newgate; and in 1818 Mr. (afterward Sir T. F.) Buxton published an "Inquiry whether Crime and Misery are produced or prevented by the present System of Discipline." From this work it appears that, notwithstanding Howard's exposures, Mrs. Fry's revelations, and the developments made by the committee of aldermen of London in 1815, the abuses of Howard's time still continued, and had in many particulars increased, and that a radical and thorough change was needed. The hulks of men-of-war were for a time used as prisons, but have been abandoned. In the United States, the work of reform was begun in Philadelphia in 1776, and has been steadily carried on by a large number of philanthropists and publicists. Chief among these have been Louis Dwight, Roberts Vaux, one of the

founders of the cellular system, Edward Livingston, Francis Lieber, Elam Lynde, the founder of the Auburn system, Amos Pillsbury, for 40 years the head of the Connecticut state prison and the Albany penitentiary, and John W. Edmonds, the founder of the New York prison association. These are no longer living; but the work is still carried on by Dr. E. O. Wines, whose extended labors in behalf of prison reform are well known throughout the civilized world, by Sanborn, Brockway, Richard Vaux, and many others. In Europe the subject of penitentiary reform has been earnestly discussed in recent years, and reforms have been urged in all countries. Prominent among the leaders have been Sir Walter Crofton in Ireland; Mr. Crawford, Alexander Maconochie, Gen. Jebb, Matthew Davenport Hill, and Miss Mary Carpenter in England; Stevens in Belgium; Pols in Holland; De Metz, Béranger (de la Drôme), Bonneville de Marsangy, and Loysen in France; Obermaier, Varrentrapp, and Holtzendorff in Germany; Guillaume in Switzerland; Count Sollohub in Russia; and Beltrani Scalia in Italy. Various prison congresses have been held in Europe since 1845, when the first, proposed by Ducpétiaux, then inspector general of prisons in Belgium, was convened at Frankfort. The most important of these was the international congress proposed by Dr. Wines and held in London in 1872. A second international congress is to be held in Europe in 1877. A permanent commission for the study of penitentiary reform, organized by the congress of London, held sessions in Brussels in 1874 and in Bruchsal in 1875. Commissions for the revision of the penal code and prison reform have been at work recently in France, Italy, and Russia. In the United States national prison congresses were held in Cincinnati in 1870, Baltimore in 1872, and St. Louis in 1874. The leading principles which it is sought to introduce into prison management in all countries are thus epitomized by Dr. Wines: "Reformation of prisoners as a chief end to be kept in view; hope as the great regenerative force in prisons; work, education, and religion as other vital forces to the same end; abbreviation of sentence and participation in earnings as incentives to diligence, good conduct, and self-improvement; the enlisting of the will of the prisoner in the work of his own moral regeneration; the introduction of variety of trades into prisons, and the mastery by every convict of some handicraft as a means of support after discharge; the use of the law of love as an agent in prison discipline, to the exclusion, as far as may be, of the grosser forms of force; the utter worthlessness of short imprisonments, and the necessity of longer terms even for minor offences, when repeated; and the intellectual, moral, and industrial education of neglected, vagrant, and vicious children, this last being, in aim and essential features, an anticipation of the industrial school and

juvenile reformatory of our day." The reformation of the prisoner is sought primarily for the protection of society. A marked tendency of advanced American opinion on the subject of penal treatment is the centralization and unification of control of all the prisons of a state, and their correlation for preventive and reformatory ends. Under the law of 1873, all prisoners in Maine, except the boys in the state reformatory, are practically under one board of control. There is also a growing tendency toward the recognition of prenatal influences producing the criminal impulse and transmitting it from one generation to another, and of the existence of physical causes of disease and degeneracy. The prevalence of these views frequently induces great caution in inflicting retributive punishment. Indeed, in some states the abolition of definite term sentences is urged, as being necessarily vindictive in some degree, and the substitution of indefinite committal to custody until such observable modifications of character are wrought as give good hope of the criminal's reform.—The association of convicts day and night was formerly much practised, and still prevails to a limited extent in some prisons of Europe; but this plan is now generally condemned. Three systems are in use: 1, the separate or cellular, known also as the Pennsylvania or "individual treatment;" 2, the associate or congregate, also called the Auburn; 3, the Irish convict, or Crofton. Transportation was practised in Great Britain as early as 1619, when 100 convicts were sent to Virginia, and afterward small numbers were occasionally sent out and sold to the planters for 7 to 14 years, a practice often alluded to by Defoe and other writers; but the business was not conducted systematically till after 1718, when for a number of years as many as 2,000 convicts were annually transported. In 1786 it was determined to establish a penal colony in Australia, and the first cargo, of 880 convicts, was sent out in 1787, to Port Jackson, near Sydney. The convicts died by hundreds of fever on the passage out; or if they arrived they were unable to earn a subsistence, and perished of famine, or, to preserve life, adopted the savage habits of the native bush rangers. At length the influx of free settlers, the extensive sheep culture, and the building up of large towns, made their condition tolerable; while the grants of lands to the emancipists, as those who had served their time were called, and the plan of allowing tickets of leave, which in some cases shortened their term of punishment almost one half, soon gave to the convict settlers a predominating influence in the colony. This led to the organization among the free settlers of a party opposed to the system, and in 1840 transportation to South Australia ceased. It was maintained in Tasmania till 1853. In 1857 an act was passed abolishing transportation entirely as a means of punishment; but convicts sentenced to penal servitude might

still be sent beyond seas by order of the secretary of state. In 1867 transportation was altogether discontinued. Transportation to penal colonies in Guiana and New Caledonia is now a part of the penal code of France, which has also agricultural penitentiaries in the island of Corsica. Under the penal laws of Spain the punishment of fetters for life is undergone with labor in designated places in Africa, in the Canary islands, or beyond the seas. Transportation into penal colonies in Africa was adopted by Portugal in 1852, and is still practised. Italy has agricultural penal colonies in the islands of Gorgona, Capraia, and Pianosa, in the Tuscan archipelago, and also in the island of Sardinia. The penal code of Russia prescribes transportation with hard labor for life, or from 4 to 20 years, to Siberia, and beyond the Caucasus.—The foundation of the separate system, as it is now practised in this country and in Europe, was laid in Philadelphia in the latter part of the last century. The abuses attending the treatment of prisoners had been strongly condemned by a number of philanthropists in that city. Prisoners were associated together day and night, and made to work in the public streets. In 1790 a law was passed by the legislature to try the system of "solitary confinement to hard labor," which was soon after adopted in the Walnut street jail. In 1821 the legislature authorized the construction of the eastern penitentiary there, which was opened in 1829. The western penitentiary had been opened in Pittsburgh in 1827, and in both the separate system was adopted. It has been discontinued in the western, but in the eastern it is still maintained. This prison was visited by De Tocqueville, Beaumont, Demetz, Blouet, Mr. Crawford, inspector general of the prisons of England, and other foreign publicists, and was taken as the model of the great English prison of Pentonville, and of other prisons in Paris, Belgium, Holland, Germany, Sweden, Norway, Denmark, and other countries. The distinguishing features of the separate or cellular system are individual separation of the prisoners day and night during the entire term of their imprisonment, communication with the officials, visits and correspondence with persons outside under prescribed restrictions, individual walks in the open air, obligatory and remunerated work for the prisoners, and mental, moral, religious, and technical individual instruction. Not only is the association of convicts prevented, but even the opportunity of seeing one another. Each is kept in a separate cell, where he eats, sleeps, works, and passes the entire term of his imprisonment, except the time spent in exercise in the small yard attached to his cell. When he leaves his cell his face, except the eyes, is covered with a cap to prevent recognition. When religious services are held, the convicts in many prisons remain in their cells. In the Belgian prisons they can

see the priest, but not one another; in the eastern penitentiary they hear but do not see the preacher. In the cellular prison at Bruchsal, Baden, they leave their cells to attend religious services and to receive secular instruction, but with their faces covered; visitors are seen in a room assigned for that purpose. The advantages claimed for this system are that it prevents mutual corruption and other evil influences of the association of convicts, promotes the manhood and self-respect of the prisoner, especially after liberation, diminishes the chances of escape, admits a variation of discipline by affording an opportunity for the separate study and treatment of each prisoner, and in consequence of its repressive and reformatory efficiency permits a diminution of the period of imprisonment. Thus by the Belgian law of 1870 a sentence of one year, if to cellular imprisonment, may be reduced to 9 months, of 5 years to 3 years and 5 months, of 10 years to 6 years and 3 months, of 15 years to 8 years and 5 months, and of 20 years to 9 years and 8 months. Those sentenced to imprisonment for life can be compelled to pass only the first 10 years in separate confinement. In the eastern penitentiary in Philadelphia the prisoner is able by good conduct to reduce his sentence one month in each of the first two years, two months in each succeeding year to the fifth, three months in each following year to the tenth, and four months in each remaining year of the sentence. Chief among the objections urged against the system are that it wars against the social instinct in men, producing a morbid state of mind and increasing the percentage of insanity, and that it is more costly than the congregate system. In reply it is maintained that the first of these objections is not supported by statistics, while the increase in cost is balanced by the decrease in the duration of imprisonment. In the United States the separate system has met with little favor outside of Pennsylvania; in every other state the congregate plan has been adopted. In Europe, however, the former has many advocates. When adopted, it is generally applied in the case of short sentences with provision for abbreviation. It has received its best development in Belgium, where it prevails almost entirely, having been first tried in the prison of Ghent in 1835. The penitentiary of Louvain, which has about 600 cells, is regarded as the model cellular prison of Europe. The system prevails in a few of the French, Prussian, Austrian, Norwegian, Swedish, and Italian prisons. Denmark has one cellular prison for male convicts in Seeland; no person can be kept in isolation longer than three years and a half. In Baden sentences to hard labor and to imprisonment are served in cellular prisons, but such confinement cannot be extended beyond three years without the consent of the prisoner. The convict prison of Bruchsal is strictly cellular. Bavaria has one cellular prison for convicts and three for persons awaiting

trial; the former is at Nuremberg, and has a capacity for 400 men. In Holland the judge may sentence to separate or associated imprisonment, but the former must not exceed two years. The three great cellular prisons are in Amsterdam, with 208 cells, Utrecht, 186, and Rotterdam, 344. Many of the local prisons are also on the separate plan.—The congregate system was first adopted in the United States in the state prison of New York at Auburn. This, however, was not the origin of the system; for it had been practised as early as 1703 at the prison of San Michele in Rome, on the portals of which was inscribed: *Parum est improbos coercere pœna nisi probos efficias disciplina* ("It is useless to punish the bad without improving them by discipline"). An excellent prison of this kind was also opened at Ghent in 1775. Industrial labor, religious and scholastic education, abbreviation of sentence, participation in earnings, &c., were found by Howard in this prison when he visited it in 1775-6, and again in 1781. But soon afterward the plan of conducting the prison was changed by the emperor Joseph II., and its reputation for excellence was lost. The construction of the Auburn prison was begun in 1816. The plan of idle seclusion in separate cells was at first adopted, and it was not till 1824 that the congregate system was fully established by Capt. Elam Lynde. Under this system the prisoners labor in association during the day, take their meals either together or in their cells, and attend religious exercises in a body. Strict silence is enjoined upon the convicts. Communication may be held with the officers of the prison, and with visitors when permission is granted. The night is passed by the prisoners in solitary confinement in a small cell. It is asserted that this system is more economical than the separate, both because the original cost of construction is much less in consequence of the cells being smaller, and because associated labor is attended with greater profit. It is also said to be better adapted to the mental and bodily condition of the convict. It prevails extensively in Europe, and exclusively in the United States except in Philadelphia.—The distinguishing features of the separate and congregate systems are united in the Irish convict or Crofton system, which was introduced by Sir Walter Crofton into Ireland in 1854, where it has since prevailed with the most successful results; and it has been accepted by many, and especially American penologists, as the best penal system yet devised. Its origin is attributed to Alexander Maconochie, who had expounded and advocated the fundamental principles of the system before putting them into practice in 1840 at the penal colony under his charge on Norfolk island. Maconochie was recalled in 1844, and the former system of cruelty was reestablished there. M. Bonneville de Marsangy of France also proposed and published as early as 1846 a plan of penitentiary treatment embodying the

main features of this system. In perfecting a plan of penal treatment, Sir Walter Crofton had to deal with the three principles of secondary punishment (*i. e.*, by terminable imprisonment) generally recognized by penologists: 1, the deterrent principle, which by the application of pain is intended to impress the convict, as well as the community, with the belief that the profits of crime are overbalanced by its losses, thus subduing by fear the desire of the criminal to do wrong; 2, the principle styled by Bentham that of "incapacitation," which is designed to render the culprit incapable of committing crime by removing him from society to the prison; 3, the reformatory principle, by which the desire of the convict to do wrong is overcome. The union of these principles into one plan of treatment in order to attain the "twofold end of punishment, amendment and example," is the basis of the Crofton system. The term of imprisonment is divided into three stages, and is passed in three different prisons: Mountjoy prison in Dublin, which has a capacity for about 500 convicts; Spike island, in the harbor of Queenstown, which will accommodate 700; and Lusk, about 12 m. from Dublin, with accommodations for 100. The first stage continues eight or nine months in separate imprisonment in a cellular prison. The treatment here is made penal by a very reduced dietary during the first four months, meat being entirely withheld, and by the absence of interesting employment during the first three months, the convicts being occupied chiefly in picking oakum. Much time is spent in receiving religious and secular instruction, and each convict is taught the entire scope of the system of imprisonment he is undergoing, and how much depends upon himself. The controlling feature of the second stage is the system of marks, by which the classification is governed and the abbreviation of the sentence determined. There are four classes in the second stage, and the time spent by a convict in each class is determined, within certain limits, by the number of marks gained. The maximum number to be attained is nine a month, three each for good conduct, attention to school duties, and industry at work. Skill is not rewarded by marks. The convict must gain 18 marks in the third class to pass to the second, 54 in the second for promotion to the first, and 108 in the first before entering the advanced class. Thus, as he can acquire only nine marks a month, he must spend at least 2 months in the first class, 6 in the second, and 12 in the first. The time passed in the advanced class depends upon the length of the sentence. It must be at least 13 months when the sentence is five years, 53 when it is 10, and 93 when it is 15 years. During the second stage the convicts are employed in association, chiefly on public works. They do not receive any portion of their earnings, but are allowed certain gratuities, which are re-

ceived on release. The chief punishments are loss of marks, forfeiture of gratuities, withdrawal of privileges, and remanding to a lower class or to the cellular prison at Mountjoy. The most remarkable feature of the Crofton system is the third or "intermediate" stage, passed at Lusk. Here are no walls, or bars, or police, or armed watchmen. There is no physical restraint, no check on conversation, no prison garb. The prisoner is here in a condition of semi-freedom, a state of probation before liberation. The convicts are employed in groups upon the farm under the supervision of a half dozen unarmed warders, who generally work with them. There is nothing to prevent escape by day or night; but the desire to escape has been manifested very rarely. The mark system is discontinued. There are no punishments, but the convict may be remanded back to separate and solitary confinement at Mountjoy. The convicts hear frequent lectures, and attend the parish church in a body. The period of detention here varies with the length of the sentence; it is 6 months on a sentence of 5 years, 11 months on one of 10 years, and 16 months on one of 15 years. The object of the treatment is threefold: 1, by exposing the criminal to the ordinary temptations and trials of the world, to test his reform; 2, to afford a guarantee to the public that the reform is real, and that the convict may be trusted; 3, to supplement the previous discipline with a more natural training, and so by partial freedom to prepare the prisoner gradually for full liberty. The same principles of progressive classification are applied to females, for whom there is a separate prison during the first stage at Mountjoy, and provision for the associated labor of the second stage in the same prison; while the intermediate or final stage is passed in "refuges." The amount of reduction which a convict may effect in the duration of his imprisonment is determined by his conduct and industry at Spike island. Suppose he is sentenced for five years: what is the maximum reduction within his reach? He must pass 8 months at Mountjoy, 33 months at Spike island (2 months in the 3d class, 6 in the 2d, 12 in the 1st, and 13 in the advanced) and 6 months at Lusk, making 41 months in ordinary imprisonment, and 6 in semi-confinement. His period of detention therefore is 3 years and 11 months, and he is restored to liberty on a ticket of license 13 months before the expiration of his sentenced term. In like manner he may reduce a sentence of 10 years to 7 years and 8 months, and one of 15 years to 11 years and 5 months. When the convict has passed through the system of penal treatment above described, and secured an abbreviation of his term of imprisonment, he is not restored to unconditional freedom, but is liberated upon a ticket of license. He is subject to the supervision of the constabulary, to whom he must report at regular intervals for registration;

and if he fails to perform the conditions of the license, he may be remanded to prison for the remainder of his term of sentence. The nearest approach to the Crofton system outside of Ireland is found in England, but without its crowning feature in the intermediate stage. It is regarded with favor in Switzerland, where some of its features have already been adopted. Its introduction into the United States, with certain modifications, is recommended by high authorities, but is opposed by others as not being adapted to a government composed of separate states. The number of inmates in the Irish convict prisons during the year ending March 31, 1874, with the average cost of their support, was as follows:

PRISONS.	Average number of convicts.	ANNUAL COST PER PRISONER.	
		Gross.	Net.
Mountjoy, male.....	151	£54 8s. 6d.	£46 19s. 7d.
female.....	295	82 6 8	26 15 5
Spike Island.....	644	30 5 3	14 7 11
Lusk.....	40	68 1 9	39 8 0
Total.....	1,130	£36 6 11	£22 17 4

—In the United States there are as many systems of prison management as there are states. There is no national institution for the confinement of offenders against the national laws, who are consequently sentenced to the prisons of the several states. All places of confinement in the United States may be divided, according to their management, into municipal (town and city), county, and state prisons; and according to the grade of offence, into juvenile reformatories, houses of correction, and state prisons. In general each county has one, and some of them two or three jails. These as well as the city prisons are generally houses of detention, though in some of the county prisons a system of industrial labor, instruction, &c., is established. The county prisons are generally considered unsatisfactory either for detention before trial or for the imprisonment of offenders after conviction, and it is earnestly sought to provide something better in place of them. This want has given rise to the class of prisons called houses of correction, workhouses, and sometimes penitentiaries. Each of the 37 states has a state prison, except Delaware, which uses the county jails for the confinement of convicted felons. New York and Indiana (including that for women) have three each, and Pennsylvania and Iowa two each, making 43 state prisons in the United States, exclusive of the convict prisons in the territories. The chief prison officers are usually appointed by the governor to hold office during good behavior; in New York they are appointed by the elective board of three prison inspectors. Most of the states have such boards, generally appointed by the governor. The New York prison association is also authorized to inspect all the prisons of

the state. Many of the prisons contain from 300 to 500 cells. The largest are in New York, that at Auburn having 1,292 cells, and Sing Sing 1,200. The Ohio penitentiary at Columbus has 1,110 cells, and that of Illinois at Joliet 1,000. These institutions, however, as well as those in other states, frequently receive a greater number of convicts than they have cells. The total number of cells in all the state prisons is about 16,000. Some of them are intended for two or more prisoners. Their average dimensions are 8 ft. long, 4½ ft. wide, and 7½ ft. high, giving for the average contents of each about 240 cubic ft. Those in the Pennsylvania prisons and the prison for women in Indianapolis are much larger; in those of Illinois, Indiana, Iowa, Massachusetts (a portion), New York, Ohio, and some other states, they are smaller. Penal or "hard" labor, as by the treadmill, the crank, the shot drill, &c., which has been so common in English prisons, hardly exists in the United States. Here the labor is industrial, of which almost every kind is practised, according to the requirements and opportunities of the locality. The contract system of labor prevails exclusively in 19 of the state prisons, the leasing system in 6, state management exclusively in 9, and a mixed system in 7. Under the contract system the labor of the convicts is generally let at a fixed sum per day, which is often very small. Penologists find objections to this system on reformatory grounds, but it is generally less expensive to the government than the management of prison labor by the officers. In large prisons it is regarded by many as indispensable; but it is thought that it can be safely dispensed with in prisons containing fewer than 200 convicts. According to the report of the national prison association, the total income of 29 convict prisons in 1873 was \$1,413,073, including \$1,328,882 earnings from labor and \$84,191 from other sources, chiefly for the board of United States prisoners. The average earnings for each of the entire prison population amounted to \$121; for each engaged in productive labor, \$173. The average per capita cost of the convicts was \$172. Of the 29 states that reported, 12 showed an excess of earnings over the total current expenses, including salaries, as follows:

STATES.	Average No. of prisoners.	Total current expenses including salaries.	Prisoners' earnings from labor.	Total income.
Maine.....	146	\$29,811	\$35,076	\$35,856
New Hampshire.....	82	18,067	22,106	23,679
Vermont.....	80	18,312	14,380	14,380
Massachusetts.....	578	117,918	181,957	141,845
Rhode Island.....	74	8,196	10,991	11,996
Connecticut.....	180	24,941	25,572	26,452
Maryland.....	587	65,466	71,104	71,104
Ohio.....	910	152,164	171,451	174,450
Indiana (Michigan City)...	354	49,748	50,069	67,465
" (Jeffersonville)...	395	66,506	65,650	67,088
Michigan.....	618	90,276	88,087	91,065
Mississippi.....	288	43,355	43,880	44,230

The total excess of earnings over expenditures in these states was \$85,588; total number engaged in productive labor, 6,544. The state prisons of Illinois, Iowa, Louisiana, and New Jersey are also self-sustaining. Since 1873 the expenses have exceeded the earnings in the Massachusetts prison. The total ordinary expenditures of all the state prisons were reported at \$3,045,789. The most economically administered prisons were those in North Carolina, where the average cost per capita was \$89; Virginia, \$99; and Rhode Island, \$101. The most expensive were Nebraska, \$454; Nevada, \$383; South Carolina, \$376; Minnesota, \$352; Wisconsin, \$313; Oregon, \$312; Florida, \$302; and Arkansas, \$300. In Connecticut it was \$128; Indiana, Michigan City \$140, Jeffersonville \$170; Maine, \$200; Massachusetts, \$193; New York, Auburn \$161, Sing Sing \$274; Ohio, \$167.—Disciplinary agencies in prison management may be divided into two classes, deterrent and reformatory, the former comprising punishments and the latter rewards, secular and religious instruction, industrial training, &c. Extreme physical punishments, by the lash, rod, strait jacket, stocks, shackles, handcuffs, ball and chain, and shower bath, are still found in the codes, if not the practice, of many states. These punishments are applied only as a last resort, and in many of the states mentioned are rarely, and in some perhaps never, put into practice. In many of the other states they are expressly forbidden by law. Public whipping still exists in Delaware. The most common punishments are the dark cell with reduced rations, deprivation of privileges, &c. The rewards are usually petty privileges, as the use of tobacco, a light in the cell, and better food. In a few prisons the convict is allowed a share of his earnings, and in many by good conduct may abbreviate the term of his imprisonment. By recent laws of Ohio and some other western states, the convict will be restored to citizenship if he passes the entire period of his sentence without violating the rules of the prison. The pardoning power is generally vested in the governor; civil rights are usually restored by pardon. The percentage of prisoners pardoned in 1873, exclusive of those discharged by commutation, was 5½. Most of the prisons have chaplains; in nearly all weekly religious services are held, and many have Sunday schools and frequent prayer meetings. The provisions for the intellectual improvement of prisoners are very inadequate, but have been considerably enlarged in recent years. Libraries are common, 83 prisons in 1873 reporting 50,663 volumes, an average of 1,535 to each; and in some prisons the convicts have the benefit of schools, individual instruction in their cells, and lectures. Secular instruction is regularly afforded in the prisons of California, Illinois, Indiana, Kansas, Kentucky, Massachusetts, New York, New Hampshire, Oregon, Pennsylvania, Rhode Island, and Wisconsin. In some of these states a

school is held once a week; in others two to five evenings a week. The regulations concerning correspondence and visits to prisoners vary greatly in different prisons. In some the frequency of both is optional with the warden; in others the convict is allowed a letter and a visit only once in three months. Little has been done in the United States toward establishing special prisons for women. The best institution of this class was opened in Indianapolis in 1873; it is a state institution, and has penal and reformatory departments. New York has a prison for females at Sing Sing, under the same administration with the male prison, and the legislature of Massachusetts has authorized the construction of a reformatory prison for women. The state prisons of the United States, with the number of cells and average number of prisoners in 1873, as reported by the national prison association, were as follows:

STATE.	Where situated.	Number of cells.	Average number of prisoners in 1873.
Alabama.....	Wetumpka.....	210	200
Arkansas.....	Little Rock.....	232	200
California.....	San Quentin.....	453	915
Connecticut.....	Weathersfield.....	232	180
Florida.....	Chattahoochee.....	1*	43
Georgia.....	Milledgeville.....	....	476
Illinois.....	Joliet.....	1,000	1,283
Indiana, north.....	Michigan City.....	330	368
" south.....	Jeffersonville.....	318	395
" women's.....	Indianapolis.....	20	22
Iowa.....	Fort Madison.....	318	270
".....	Anamosa.....	....	....
Kansas.....	Leavenworth.....	344	331
Kentucky.....	Frankfort.....	674	600
Louisiana.....	Baton Rouge.....	493	409
Maine.....	Thomaston.....	174	146
Maryland.....	Baltimore.....	700	587
Massachusetts.....	Charlestown.....	652	573
Michigan.....	Jackson.....	643	616
Minnesota.....	Stillwater.....	163	91
Mississippi.....	Jackson.....	200	288
Missouri.....	Jefferson City.....	....	1,062
Nebraska.....	Lincoln.....	....	44
Nevada.....	Carson City.....	46	93
New Hampshire.....	Concord.....	132	82
New Jersey.....	Trenton.....	536	545
New York.....	Auburn.....	1,292	1,120
".....	Danmora.....	548	540
".....	Sing Sing, male.....	1,200	1,163
".....	" female.....	108	108
North Carolina.....	Raleigh.....	83	401
Ohio.....	Columbus.....	1,110	910
Oregon.....	Salem.....	88	95
Pennsylvania, east'n.....	Philadelphia.....	560	625
" west'n.....	Allegheny.....	343	422
Rhode Island.....	Providence.....	88	74
South Carolina.....	Columbia.....	350	250
Tennessee.....	Nashville.....	352	744
Texas.....	Huntsville.....	....	1,150
Vermont.....	Windsor.....	104	80
Virginia.....	Richmond.....	73	782
West Virginia.....	Moundsville.....	224	98
Wisconsin.....	Wapun.....	560	180
Total.....	.....	14,668	13,492

—There is a class of prisons in the United States, generally called houses of correction, work-houses, and sometimes penitentiaries, which hold a middle place between the municipal or county jail and the state prison, and are intended for the treatment of those convicted

of lighter offences, though felons are sometimes confined in them. These institutions form an important link in any true prison system, and from them have sprung many of the practical reforms of prison administration wrought in America. They are preventive of crime by their wise and thorough treatment of misdemeanors who are as a rule developing into felons. They are commonly managed and maintained by the county or city, but some receive state convicts. Most of them have systems of discipline, labor, instruction, &c., similar and sometimes superior to those of higher prisons. Institutions of this kind are maintained in Massachusetts, Rhode Island, New York, Pennsylvania, Michigan, Ohio, Wisconsin, Kentucky, Missouri, California, and perhaps some other states. New York has six under the title of penitentiaries. The most noted and best managed of these institutions are the Albany and the Monroe county penitentiaries in New York, the former brought to its high degree of excellence by Amos Pillsbury; the Detroit (Mich.) house of correction, organized and conducted during the first ten years of its existence by Z. R. Brockway; and the Allegheny county (Pa.) workhouse at Claremont, under the superintendence of Henry Cordier. In each of these there is an excess of earnings from the labor of the prisoners over the expenses of the institution; and each has excellent schools. The house of correction in Boston, Mass., is sometimes self-sustaining. Another prison of this class, called the state house of correction, is in process of construction (1875) at Ionia, Mich.; also one at Elmira, called the New York state reformatory. The Albany penitentiary is one of the principal places of confinement for United States prisoners. For institutions for the treatment of juvenile offenders, see REFORMATORIES.—The system of penal treatment in England in many respects is similar to that of Ireland. The intermediate or probationary stage, which forms so important a feature in the Irish system, is not found in the English, except in the treatment of female convicts. All convicts sentenced to penal servitude are required to pass through three principal stages. The first is passed at Pentonville, and continues for nine months, during which the prisoner spends his entire time, excepting that devoted to prayer and exercise, alone in his cell, working at some industrial or remunerative employment. The treatment here, especially the diet, is sternly penal; but the convicts have the use of books, and, besides receiving religious instruction, are taught reading, writing, &c. From here the prisoner is removed to one of the other convict prisons, where he works in association, but spends the rest of his time in a separate cell. The prisoners are chiefly employed on public works, farming, clearing and reclaiming land, &c.; but in some of the prisons boot making, tailoring, and other indoor employments are carried on. The convicts

* Large dormitory.

† Recently constructed.

are divided into four classes, the higher classes having privileges not found in the lower. Promotion is determined by marks, which are given not for good conduct, but for industry alone. In addition to the privileges acquired by promotion to a higher class, the prisoner may gain a remission of about one fourth of his sentence, or if a female, about one third. The chief advantages offered by the higher classes are more frequent communications by visit or letter with friends, more freedom for exercise on Sundays, and higher gratuities of money to be paid on the prisoner's discharge. Convicts receive no share of their earnings, but each is allowed sufficient money on discharge to maintain himself while seeking employment. There is no extra reward for good conduct; but bad conduct is punished by degradation to a lower class and the loss of privileges gained by industry, as well as by solitary confinement, reduction in diet, and corporal punishment. Only the governor and director have the power to punish, under limits defined by the secretary of state. Unusual punishments are prohibited; but whipping is practised, and chains, handcuffs, or means of special restraint may be used in certain defined circumstances and under strict regulations. The privilege of petitioning the secretary of state is given to every convict. When the prisoner has secured a remission of a portion of his sentence, he is liberated on a ticket of license. He is now subject to police surveillance, and will be remanded to prison for a violation of the conditions of the license. Formerly it was the custom to transport convicts thus conditionally liberated on a ticket of leave; but since 1867 this practice has been discontinued. The same course of treatment is applied to females; but they may earn a larger proportion of remission, viz., one third; while those whose reform appears to be complete may pass the last six months of their imprisonment in "refuges" established and managed by private effort, assisted by contributions from the government. Of these there are three: the Carlisle memorial at Winchester, the Eagle house at Hammersmith for Roman Catholics, and the Westminster memorial at Streatham. The number of inmates of the English convict prisons during the year 1873 was as follows: Brixton, 504; Chatham, 1,682; Dartmoor, 939; Fulham (females), 277; Millbank, 1,122 (908 males, 214 females); Parkhurst, 552; Pentonville, 911; Portland, 1,586; Portsmouth, 1,282; Woking, 1,390 (718 males, 672 females); total, 10,245. The gross annual expenses were £342,158, and the net earnings of the convicts £220,490; balance, £121,668, making the net cost of supporting each convict during the year £11 14s. 6d. The earnings of the convicts exceeded the expenditures at Chatham and Portsmouth, and very nearly equalled them at Portland. The extensive government works at these points, the sea walls, docks, &c., including both the skilled and un-

skilled labor, have been constructed by convicts.—France has six classes of prisons: 1, the penal colonies of Cayenne (Guiana) and New Caledonia; 2, central prisons (*maisons de force et de correction*), of which there are 16 for men and 7 for women, corresponding to the state prisons in the United States; 3, departmental prisons, about 400 in number, designated also as houses of arrest, of justice, and of correction; 4, establishments for the correctional education of juvenile delinquents; 5, chambers and depots of safe keeping; and 6, prisons for the army and navy. The chief sentences, besides death, are hard labor for life or for a term of 5 to 20 years, reclusion for 5 to 10 years, and simple imprisonment for from 6 days to 10 years. Sentence to hard labor is attended with civil degradation and civil death, the property of the culprit being under the control of a guardian. After the expiration of a sentence to a limited term of hard labor, the criminal during the remainder of his life is under the supervision of the police. Except women and men 60 years of age and over, who undergo imprisonment in the central prisons, persons sentenced to hard labor are transported to one of the penal colonies. If the sentence is for less than eight years, the convict must remain in the colony after the expiration of his punishment during a period equal to the length of his sentence; if the sentence is eight years or more, such residence is made perpetual. The transportation of women is authorized by law in view of marriages to be contracted with the convicts in the colony after liberation; some women have been thus sent to Cayenne, but a majority undergo imprisonment in the central prisons of France. A sentence to the punishment of reclusion deprives the criminal of civil rights. Every person so sentenced is confined in a central prison and employed in labor, which may be in part applied to his own benefit. Simple imprisonment is a correctional punishment, which however may work partial or entire loss of civil rights. In case of relapse, the duration of the punishment may be doubled. If the sentence is for more than a year, the culprit is sent to a central prison; if a year or less, to a departmental prison. The product of the prisoner's labor goes partly to the prison and partly to secure for himself, if deserving, certain privileges, or to form a fund to be used when discharged. Houses of arrest, of justice, and of correction are usually three departments of the same prison. Besides the punishments here described, the penal code recognizes that of deportation, or transportation for life to a place without the continental territory of the republic, upon pain of sentence to hard labor if the offender return; and detention for from 5 to 20 years in one of the French continental fortresses. The cellular system does not prevail in any of the central prisons; the convicts are here employed together in workshops during

the day, with cellular separation at night. A few of the departmental prisons are cellular, but even in these the strict separate system is not practised. Three prisons in Paris, however, are constructed and conducted on the cellular plan: Mazas, a part of La Santé, and La Petite Roquette; the last named is a prison for persons under 16 years of age and persons sentenced to an imprisonment not exceeding six months. The law of May, 1875, provides that persons awaiting trial shall be confined in separate cells, subjects those sentenced to 12 months' imprisonment or less to solitary confinement, and gives those with longer sentences the privilege of choosing separate confinement. Penal as distinguished from industrial labor does not exist in the prisons of France. Industrial labor is obligatory upon those serving sentences, and optional with the arrested and the accused. Extensive workshops are organized in the central prisons. In the male central prisons about 50 or 60 industries are carried on, the principal of which are weaving, tanning, and the manufacture of boots and shoes, buttons, hosiery, locks, and hardware. Three of the central prisons are "agricultural penitentiaries," or colonies in the island of Corsica where the convicts are employed in agricultural work. Sewing is the chief industry in the central prisons for females. The contract system of labor prevails in most of the prisons, but in several important establishments the industries are managed directly by the state. Convicts are allowed a portion of their earnings, being in the central prisons from three tenths to five tenths, according to the grade of the sentence. A portion may be used by the convict while in prison, and the balance is reserved till his discharge. The prisoners contribute about 50 per cent. of the cost of maintenance in the central, and about 17 per cent. in the departmental prisons. A few of the central prisons are self-sustaining or nearly so. The more important prisons are generally provided with chaplains, schools, and libraries; but only about 12 to 15 per cent. of the population in the prisons for males, and 5 to 8 per cent. in those for females, are admitted to the schools. Corporal punishment is prohibited in all prisons.—All the prisons of Belgium are under the jurisdiction of the minister of justice, and are subject to the supervision and inspection of commissions. Nearly all are conducted on the separate plan. There are three general classes: houses of correction, houses of reclusion, and convict prisons. In the first are confined prisoners sentenced to simple imprisonment for terms of 8 days to 5 years; in the second, those sentenced for from 5 to 10 years; and in the third, those sentenced to hard labor for life, from 10 to 15 years, or from 15 to 20 years. Industrial labor prevails in all prisons, penal in none. The labor is directed in part by the government, and in part is awarded to special contractors, preference being given to the latter plan. A sys-

tem of apprenticeship prevails, by which prisoners are taught various trades. The prison industries are varied and extensive. The prisoners receive a portion of their earnings, and rewards for good conduct, including reduction of sentence. Every prison with 50 or more inmates is provided with a school or a teacher, and school attendance is generally obligatory. Libraries are found in all prisons. The three great central or convict prisons of Belgium are those of Louvain, Ghent, and Antwerp.—All the prisons of Prussia are subject to a central authority, the large penitentiary establishments or central prisons being under the minister of the interior. There are 29 prisons exclusively for hard labor, 15 for imprisonment and simple detention, and 11 of a mixed character. The capacity of all is about 26,500. In 47 there is an aggregate of 3,247 cells for solitary imprisonment by day and night; but in only one of these is the separate system exclusively adopted; in the other 46 the cellular and the congregate systems both exist. The punishments prescribed by the penal code are hard labor, simple imprisonment, imprisonment in a fortress, and detention for minor offences. Sentence to hard labor may be for life or from one to 15 years. It subjects the prisoner to compulsory labor without restriction, both inside and outside the prison, and disqualifies him from serving in the army or navy, or in any public office. The judge may add civil degradation. In simple imprisonment, limited to five years, the convict cannot be compelled to work outside of the prison, or at occupations not in accord with his capacity or previous social condition. If the sentence is for three months or more, the judge may add civil degradation. Prisoners sentenced to hard labor or to imprisonment may be liberated provisionally at the expiration of three fourths of their sentence, provided they have been at least a year in confinement. Imprisonment in a fortress may be for life or for a term of years, not exceeding 15. The punishment is simply privation of liberty. The chief classification of prisoners in Prussia is the separation of the young from the old. Penal labor does not exist. Industrial labor comprises not less than 50 different trades carried on by men and 10 by women. The contract system prevails almost exclusively; the labor of the prisoners being let out, not to a few general contractors, but each industry to a special contractor. Prisoners are allowed a variable portion, not exceeding one sixth, of the product of their labor, to be used partly while in confinement and the balance after release. Among the punishments permitted is castigation in the case of men, limited to 30 lashes, and only when authorized by the director of the prison at the request of the superior officers, including the chaplain and surgeon. Chaplains, all forms of worship, schools, and libraries exist in all important prisons. About 15 per cent. of all the prisoners receive scho-

lastic instruction; those without trades must serve an apprenticeship. The prison libraries comprise upward of 150,000 volumes, about one half religious.—In Cisleithan Austria all prisons are under the jurisdiction of the ministry of justice; matters of minor importance, however, are intrusted to the local and intermediate authorities. Since 1867 there has been an inspector general of prisons. There are 18 prisons (12 for males, having in 1872 about 9,000 inmates, and 6 for females, with 1,500 inmates) for persons sentenced to more than one year of imprisonment; 62 for those sentenced to less than one year, which are also used for persons convicted of lighter offences; and prisons of the district courts for minor offences. Separate prisons are used for men and women. Until recently only the associated system of imprisonment existed, and it now prevails in nearly all the prisons. The convicts are classified in groups of 6 to 30, day and night, and are allowed to converse together except when at work. All prisons constructed since 1867 have been so arranged that associated imprisonment may be combined with cellular. Provisions for cellular treatment are found in the prisons of Gratz, Stein, Karthaus, and Pilsen. By the law of April 1, 1872, cellular imprisonment is limited to three years, with the provision that after three months of isolation two days passed in a cell are to be reckoned as three in the term of the sentence. In all prisons where the collective system prevails, a classification of prisoners is maintained in the dormitories, based on the age, education, state of mind, and former life of the convict, and the kind of crime committed. There is no way in which a convict may secure an abbreviation of his sentence except by being recommended for pardon to the emperor. Penal labor does not exist; a wide range of industries are carried on within, and some without, the prisons. The contract system is preferred where suitable contractors can be found; otherwise the industries are managed directly by the state. Convicts are entitled to a share of their earnings, to be used partly while in prison and partly after release. If the prisoner has property, it is liable for the cost of his imprisonment. Trades are taught to the unskilled. Corporal punishment is not practised. The severest punishments are chains, diminution of food, hard bed, isolated confinement, and dark cell. Banishment after the expiration of the sentence is recognized by the penal code. The prisons are generally provided with chaplains, schools, and libraries, though the last are of recent origin. School attendance is obligatory upon convicts of a suitable age. Political prisoners are absolved from compulsory labor and from wearing prison clothes.—In Switzerland most of the cantons prescribe three kinds of imprisonment: reclusion, perpetual or temporary detention in a house of correction, and simple imprisonment. Many of the cantons are introducing

important reforms into their prison systems, including progressive classification and provisional liberation. In the penitentiary of Neuchâtel, which has an average of 80 inmates, many of the features of the Crofton system have been adopted. The excellent system of discipline, labor, rewards, education, privileges, &c., adopted here by Dr. Guillaume, the director, has made this one of the model prisons of Europe.—The penal system of Italy is in a state of transition. The new code retains the death penalty, and prescribes as secondary punishments the *bagnio* for life (*ergastolo*), reclusion, and relegation. As a general rule *ergastolo* must be passed in one of the islands in continual separation for the first ten years, and afterward in congregate imprisonment. Sentences to reclusion and relegation, which are penalties of temporary duration, are to be served upon the congregate plan. Not fewer than 3,000 convicts are engaged in agricultural work, and 1,500 employed by private contractors or municipal bodies in the construction of ports and roads, in collecting and transporting salt from the mines of Cagliari and Portoferraio, in working iron mines, in masonry, and in other outdoor occupations. At the penal settlement of Cagliari much attention is given to the rearing of the silkworm, and at Alghero the culture of tobacco is a prominent industry. More than 1,000 prisoners are employed at the three agricultural colonies on the islands of Pianosa, Gorgona, and Capraia, in the Tuscan archipelago, chiefly in the cultivation of vines, olives, and cereals. The prisoner is entitled to a share of the product of his labor. He is required to attend school, where among other things he is taught the science of agriculture. The agricultural colonies are intended for those convicts who have been sentenced to reclusion, relegation, or simple imprisonment, and who have distinguished themselves in the penal establishments by good conduct.—In nearly all the countries of Europe efforts are made to aid liberated prisoners by securing for them employment and protection. This work is generally done by prisoners' aid or patronage societies, aided sometimes by the government. In some instances direct efforts are made by the government in behalf of discharged convicts. The Netherlands society for the moral amelioration of prisoners, both before and after discharge, has its seat in Amsterdam, with as many as 40 branches in different parts of the country. Denmark has prisoners' aid associations in the vicinity of each of its four great prisons. In England much importance is given to aiding convicts after discharge, and 34 societies have been established for this purpose. A semi-official character is given to them by the fact that they hold in trust the gratuities allowed by law to discharged convicts. Prisoners are also placed for a limited time after discharge under the surveillance of the

police. More than half of the male convicts discharged in 1873 applied to prisoners' aid societies, and more than three fourths of the females went to such societies or refuges. In the United States the organizations for aiding liberated prisoners are few. Massachusetts has an official agency. The other most efficient organizations are the New York prison association, the Philadelphia prison society, the Maryland prisoners' aid society, and the California prison commission. The prison association of New York was incorporated by the legislature in 1844; it is authorized to visit and inspect all the prisons of the state, and makes annual reports to the legislature. It has agents in all parts of the state to look after the interests of prisoners in confinement, and to aid them after discharge with money, board, clothing, tools, transportation, employment, &c. About 1,500 discharged convicts were aided by this association in 1874.—The marked lack of uniformity in the returns made by different countries renders their criminal statistics only approximately useful for purposes of comparison. A computation made by Beltrani Scalia, on returns from Belgium, Denmark, Holland, Italy, Saxony, and Sweden, shows about one half of the entire prison population of those countries to be illiterate. According to recent returns, the percentage of those who could not read on entering prison was 56 in Austria, 49 in Belgium, 57 in France, 4 in Baden, 12 in Bavaria, 17 in Prussia, 60 to 92 in Italy, about 40 in the Netherlands, and 30 in Switzerland. In Ireland 22 per cent. both of males and females were illiterate. In Austria 8 per cent. of the male and 24 per cent. of the female convicts had no trade on entering prison; in Belgium the percentage for both sexes was 60 to 70; in France, 5 per cent. among males and 12 per cent. among females; Baden, 40 per cent.; Bavaria, 3; Prussia, 5; the Netherlands, 25; Sweden, 90; Switzerland, 50; Ireland, 35. In Belgium and England, about 12 per cent. of the prison population are females; in Baden, 15; in Bavaria, 20; in France, 19; in the Netherlands, Prussia, and Sweden, about 18; in Norway, 24; in Russia, 10; in Switzerland, 20. The proportion of recidivists, or those who after imprisonment relapse into crime and are returned to prison, is reported at about 59 per cent. among men and 54 per cent. among women in Austria, 78 per cent. in Belgium, 20 in Baden, 30 in Bavaria, 42½ in France, 18 to 28 in Italy, 25 to 28 in the Netherlands, 60 to 70 in Prussia, 19 to 45 in Sweden, and 36 in Würtemberg. More than 18 per cent. of the sentences to penal servitude in England, Wales, and Scotland during the four years ending Jan. 1, 1874, were reconviictions. It is stated that nearly 70 per cent. of the recidivists in Belgium were those who had been confined in the congregate prisons. Of those committed to convict prisons in the United States in 1873, 21 per cent. were minors and 67 per cent. under 30 years of age; 75 per cent. were of native

and 25 of foreign birth. Thus, while about 17 per cent. of the total population of the United States are foreigners, not less than a fourth of the criminal population are foreigners. In the northern and especially the eastern states, where there is a larger foreign element in the population, the percentage of foreign convicts is much larger than that given above. Thus in Massachusetts it was 55 per cent., Minnesota 42, New York 39.5, California 39, New Jersey 37, Indiana (males) 32, and Michigan 30. About one sixth of the prison population are women. In the southern states a large proportion of the convicts are colored; 48 per cent. were illiterate, and 70 per cent. had not learned a trade; 40 per cent. admitted intemperate habits, and 39 per cent. more claimed to be moderate drinkers, but acknowledged occasional intoxication, leaving only 21 per cent. claiming to be strictly temperate.—The most satisfactory information on the penal systems of Europe and the United States may be found in the volume of transactions of the London congress (London, 1873), and in the three reports of proceedings of the three congresses held by the national prison association of the United States. Annual reports have been issued by the prison association of New York since 1844, and valuable information and statistics relating to crime and the treatment of criminals are contained in the "American Journal of Social Science," of which seven numbers had been issued in 1874; in the reports of state boards of charities, which are organized in several of the states; and in the reports published by the various penal and reformatory institutions of the United States. The general principles of penal treatment and legislation are expounded in the works of Howard, Beccaria, Bentham, Edward Livingston, Francis Lieber, and others. Among more recent publications are: "Crime, its Amount, Causes, and Remedies," by Frederic Hill (London, 1855); "Suggestions for the Repression of Crime," by M. D. Hill (London, 1857); "On Cellular Separation," by W. Parker Foulke (Philadelphia, 1861); "Our Convicts," by Mary Carpenter (2 vols., London, 1864); *De l'amélioration de la loi criminelle*, by Bonneville de Marsangy (2 vols., Paris, 1864); *Kritische Untersuchungen über die Grundsätze und Ergebnisse der irischen Gefängnisskunde*, by Baron von Holtzendorff (Berlin, 1865); *Des progrès et de l'état actuel de la réforme pénitentiaire, et des institutions préventives aux États-Unis, en France, en Suisse, en Angleterre et en Belgique*, by Ducpétiaux (3 vols. 18mo, with plates, Paris and Brussels, 1867); "History of the Albany Penitentiary," by David Dyer (Albany, 1867); *Sul governo e sulla riforma delle carceri in Italia*, by Martino Beltrani Scalia (Turin, 1867); "Brief Sketch of the Origin and History of the State Penitentiary for the Eastern District of Pennsylvania at Philadelphia," by Richard Vaux (Philadelphia, 1872); "The Crofton Prison System," by Mary Carpenter (Lon-

don, 1872); *La question pénitentiaire*, by Robin (Paris, 1873); "Causes of Criminal Recidivants and their Means of Prevention," by Olivaerona (Stockholm, 1873); "Penitentiary Studies," by Don P. Armengol y Cornet (Barcelona, 1873); "Swiss Prison Discipline," by J. K. Kühne (St. Gall, 1873); "Works of Edward Livingston on Criminal Jurisprudence" (2 vols., New York, 1873); "Report on the Working of the Separate System of Imprisonment in Holland," by De Vries (the Hague, 1874); "National Education and Punishments," by C. B. Adderly (London, 1874); *Les établissements pénitentiaires en France et aux colonies*, by Viscount d'Haussonville (Paris, 1875); and "Memorials of Millbank and Chapters in Prison History," by Arthur Griffiths (2 vols., London, 1875). The *Rivista di disciplina*, edited by Beltrani Scalia, inspector general of Italian prisons, and devoted to penitentiary science, is published monthly in Rome.

PRISREND, or **Perserin**, a town of European Turkey, capital of a vilayet of the same name in northern Albania, on the Rieka near its confluence with the Drin, 75 m. E. of Scutari; pop. variously estimated at from 20,000 to 48,000. It is built at the foot of a mountain, which is commanded by a castle, where the governor resides; a Greek bishop also resides here. It is chiefly noted for its manufacture of firearms and extensive traffic.

PRIVAS, a town of Languedoc, France, capital of the department of Ardèche, 70 m. S. of Lyons; pop. in 1872, 7,836. It is situated on a steep ridge near the junction of the Ouvèze and Mézayon, and contains a prefecture with a park, a small geological museum, a college and primary normal school, and manufactories of silk and other goods. It was a stronghold of the Huguenots, with an almost exclusively Protestant population. A synod of all French reformed churches was held here in 1612. Louis XIII. exterminated the Protestants in 1629, and razed the fortress in which they had taken refuge.

PRIVATEER, an armed private vessel which bears the commission of a state to cruise against the commerce of its enemy. When one sovereign has duly declared war against another, all the subjects of the former are enemies of all the subjects of the latter. From this principle of the law of nations follows the unquestionable corollary, that no citizen of one of the belligerent states can complain of the hostile acts of any citizen of the other. Therefore, as far as absolute international rights are concerned, it makes no difference whether a depredation or capture by a subject of the enemy has been expressly sanctioned by his sovereign. The universal practice of nations, however, condemns all unauthorized hostilities; and a capture or other hostile act without the sanction of a competent sovereign power, although, strictly speaking, it would not be piracy, yet would be so much like it, or so irregular and odious, that it would un-

questionably provoke the severest treatment at the hands of an enemy against those who engaged in it. Yet, though unauthorized capture of enemy property is no offence under the law of nations, it is an infraction of the public law of the captor's own state. For the universal rule is that, except in self-defence, only those subjects may take part in hostilities who are thereto expressly or constructively authorized by their sovereign. But the sovereign may, if he will, avail himself of the private vessels of his subjects by commissioning them to seize the merchant ships of the enemy. These commissioned private ships or privateers are in naval warfare much the same as the volunteer corps are in the land service. In both cases the commissions proceeding from the sovereign make those who bear them the instruments and servants of the state. On the sea it is the letters of marque which give that interest in the prize which is the inducement to engage in the service. For, primarily, all prizes vest in the state, and it is the commission alone which, under the municipal regulations of each state, defines the proportion of the captured property and the other rewards which shall fall to the privateersman. (See PRIZE.) To guard against the excesses and abuses which are incident to privateering, it has been subjected to various restrictions. Some states have regulated the composition of the crews, and have forbidden all cruising in the rivers or along the coasts within the sea line of the enemy. Generally commissions are granted on condition that the rights of neutrals shall be respected, and that belligerent rights shall in all cases be enforced according to the rules of war; that prizes shall be brought for adjudication before the proper tribunal; and that the whole conduct of the cruise shall be confined to the instructions of government. Bonds are taken for the due performance of these engagements, and owners and officers are subjected to penalties for the violation of them.—Privateering may be regarded in two aspects, or rather it may be said that there are two kinds of privateering, one of which is far more legitimate and defensible than the other. The former of these kinds is that in which the citizens of one of the states at war sail under their own flag against the enemy. They find employment in this way for the ships which during war must almost of necessity be withdrawn from trade; and they contribute very materially to the maritime strength of their state. The other and more odious form of privateering is that in which a neutral accepts a commission from one of two belligerents. Here the legitimacy of the practice is not so clear, at least so far as affects the neutral. He can certainly have no patriotic motive in accepting such a commission. Such a motive is rare probably even when the privateer sails under the flag of his own country; but then the country does really derive some benefit from the service. In the case supposed, the

neutral is a sort of legalized pirate, and so indeed he is regarded by those conventions and treaties which, in condemnation of this abuse of the international laws of war, almost all nations have entered into. Indeed, by such conventions and treaties, and by the municipal statutes by which nations forbid their subjects from equipping privateers or enlisting men for service in any foreign war, this species of privateering seems to be well nigh repressed. Not so the other. For nearly a century the expediency of its suppression had been at intervals elaborately discussed; yet in all that period but little advance had been made toward the settlement of the question. In 1856 the subject was revived at the congress which convened at Paris after the Crimean war, and the states there represented made mutual engagements to surrender the practice of privateering. The United States had early made an effort to abolish it. In 1785, and while he was negotiating with Prussia the treaty which was afterward concluded, Dr. Franklin wrote: "The United States of America, though better situated than any European nation to make profit by privateering, are, so far as in them lies, endeavoring to abolish the practice, by offering in all their treaties with other powers an article engaging solemnly that in case of future war no privateer shall be commissioned on either side, and that unarmed merchant ships on both sides shall pursue their voyages unmolested." Dr. Franklin procured the insertion of both these propositions in the treaty with Prussia. In the subsequent treaty of 1799 with that power, however, all provisions of this character were omitted. In 1792 the legislative assembly of France proposed that nations should agree by mutual conventions to abolish privateering and the seizure of private property on the ocean. The proposal met but little favor, and these practices were perhaps never more extensively carried on than during the wars which followed the French revolution. Again in 1824 the subject was revived, when, on our part again, it was urged upon the attention of the English government. But the plenipotentiaries, Messrs. Huskisson and Stratford Canning, declined to entertain the propositions of our minister, Mr. Rush, and he reported to government that in his opinion Great Britain was unwilling, under any circumstances, to accede to the abolition of private war upon the ocean. But a radical change in the sentiments of English publicists upon this question is indicated by the language of Lord Clarendon in 1854. In submitting to our ambassador, Mr. Buchanan, the declaration respecting neutrals which France and England afterward issued, the British minister advocated the abandonment of privateering, and expressed his condemnation of the practice as one which was "inconsistent with modern civilization." Mr. Buchanan replied; that under existing circumstances it did not seem possible for the United States to agree

to a surrender of the practice, unless the naval powers of the world would go one step further and consent to the abolition of all war against private property upon the ocean, as was already agreed upon as to private property upon the land. In answer to Mr. Buchanan's despatches, Secretary Marcy reminded the British government that the United States laws go as far as and even further than those of any other nation in prohibiting its subjects from entering into foreign privateer service; but he added that the country would not enter into any convention whereby it would preclude itself from resorting to its merchantmen in case of war. Finally the submission to our government of the declaration which was signed at Paris in 1856, by the plenipotentiaries of the chief states of Europe, called for a new consideration of the question. Besides provisions affecting the rights of neutrals, the convention contained an article which declared that privateering was abolished. The four points of the declaration were to be regarded as an entirety; they were to be binding only between those powers which assented to them; and the states that signed the convention undertook to invite the accession of those powers which were not represented at the congress. Most of the secondary states of Europe and America gave prompt adhesion to the articles of the declaration. The answer of our government to the declaration was, through Mr. Marcy, that the United States would accept the whole of it "in case the clause abolishing privateering were amended by adding that the private property of the subject or citizen of a belligerent on the high seas should be exempted from seizure by public armed vessels of the other belligerent, except it be contraband of war." This was declined, and there the matter was suffered to rest until the breaking out of the civil war in the United States in 1861, when Secretary Seward on behalf of the government, in view of the resolution of the confederate government to issue letters of marque to privateers, offered to assent to the declaration of Paris without the Marcy amendment; but this was declined by the governments of England and France if coupled with the condition that it was to be made applicable to the case of the Confederate States.

PRIVET (also called in England prim and primprint), a name formerly given to the primrose, and afterward unaccountably transferred to *ligustrum vulgare*, the generic name being the classical Latin one. It is a shrub which has been so much cultivated that in Europe its limits in a wild state are quite lost, but it is thought to be indigenous in England; it grows 6 or 8 ft. high, with long slender branches and opposite simple leaves, which in mild climates are evergreen, or remain until the new leaves appear. Its small white flowers, in compact panicles at the ends of the branches, have a four-toothed calyx and a four-lobed corolla, with a short tube; the fruit is a spheri-

cal, black berry, two-celled, with one or two seeds in each cell. It belongs to the same family with the olive, to which it is closely related. The privet is largely used in Europe for ornamental hedges, and was early in the century planted as a hedge in this country; but while



Privet (*Ligustrum vulgare*).

it has many qualities which adapt it to the purpose, it is here subject to a sudden blight or disease which has caused it to be abandoned. In the older states it has become thoroughly naturalized through the agency of birds. Planted in a shady place, it is a pleasing ornamental shrub, but if exposed to the full sun at noon, its flowers wither in a day; it grows well in the drip of deciduous trees, and is especially useful near the sea, where few ornamental plants flourish. The wood of the privet is hard and close-grained, and when of sufficient size serves for turning. The leaves and bark are bitter, and the smaller twigs are used in some parts of Europe for tanning leather. The young slender branches and shoots are employed like osiers for basket making and as withes. The berries afford a rose color which is used in tinting maps and prints, and dye green if alum is used as a mordant; they are also eaten by several kinds of birds. A greenish oil fit for lamps or to make soap is extracted from them by pressure. There are several varieties, such as the white-, yellow-, and green-berried, the narrow-leaved, and the variegated leaved. It is readily propagated by cuttings or by seeds.—The Japan privet (*L. Japonicum*) has large, thick, shining, evergreen leaves, which are broader than in the common species, and larger, pure white, slightly fragrant flowers. This and a variegated form of it are charming greenhouse shrubs in the northern states, but grow in the open air at the south.

PRIVY COUNCIL. See **COUNCIL**.

PRIZE, any property captured in virtue of the rights of war. A difference exists in practice between war on land and on the sea in

respect to private property. At sea all the property of every citizen of a belligerent country is liable to capture; but on land it is customary to respect private property. There is, however, no absolute rule on this subject, and in the late civil war both parties passed acts for the confiscation of enemy's property captured on land. Cotton in particular, being the chief resource of the Confederate States, was deemed to be peculiarly a proper subject of capture, and the acts of congress providing therefor were sustained and enforced by the courts.—The general rights of a belligerent are to make captures by his public armed vessels of war, to grant commissions to private persons for the same object, and to establish tribunals of prize for the purpose of examining into all maritime captures, and of judicially deciding upon their validity. By the declaration of war all the citizens of the belligerent countries respectively become enemies, and the citizens of one country may seize any property of the other that they may meet with at sea. Property so seized belongs to the sovereign of the country, and not to the captors, unless it is given to them as an act of grace on the part of their sovereign. For this reason, and also that the government of the country may have the power to limit and control the operations of the war, commissions are usually granted by the government to private persons, authorizing them to make such captures, and after adjudication by a competent tribunal they are entitled to the proceeds of the prizes thus taken. (See **PRIVATEER**.) It is obviously necessary that when a capture has been made there should be some tribunal with authority to pass upon the validity of the capture, and to pronounce a decree of condemnation or acquittal. It is therefore the right and duty of the government of a country, on the declaration of war, to establish tribunals of prize; and it is then responsible to all foreign nations for the correctness of the decisions therein made. So far as the property in question is concerned, the sentence of the prize court is conclusive upon all the world. If the sentence is one of condemnation, the title of the former owner is divested, and all nations are bound to respect the new title acquired under it. But to give the decision of the court this effect, it must appear conclusively that the court had jurisdiction over the property in question. The court must be established in the country of the captor, or in that of his ally in the war, but it is not necessary that the prize should be brought within a port of one of these countries. It is the practice of Great Britain and of the United States to adjudicate upon captures which have been carried into a neutral port.—The next question to be considered is: Who are enemies, and what property is liable to capture? For this purpose not only the native-born citizens of the belligerent are considered as enemies, but all persons who have their domicile in the hostile country; and the citi-

zens of a country which is under the permanent or temporary dominion of the enemies of another country are considered as the citizens of the latter, and all trade with them is illegal, unless the government chooses to recognize the country as neutral, in which case courts of justice are bound by such recognition. It is very doubtful whether a citizen of one country can expatriate himself on the breaking out of war, in order to acquire neutral rights and privileges; but it is certain that if he removes in order to mask his mercantile projects under a neutral flag, such an act is fraudulent and of no avail. But if he has removed during peace, and acquired a domicile in a foreign country, he may engage in trade with a country which is at peace with his adopted country, although at war with that of his nativity. A citizen of one country residing and doing business in another, resumes his native character if, on war breaking out, he puts himself *in itinere* to return to the country of his birth or adoption; but the mere intention without some overt act is not sufficient. A man may have a neutral residence, and yet his property may acquire a hostile character. So, he may be a merchant in more countries than one, and may thus acquire at least a *quasi* domicile besides that of his birth and parentage; and this would be respected by the law, provided there was no indication of fraudulent intention, that is, of giving himself two national characters, between which he could choose from time to time, as suited the exigencies of the moment. The property of a house of trade in an enemy's country is liable to condemnation, whatever be the domicile of the partners who constitute the house. If some of the partners have a neutral residence, their separate property will not be affected by the fact of their being connected with a house of trade in a hostile country. And when a shipment is made by the house to a partner in a neutral country, or by a partner in a hostile country to a house in a neutral country, it depends upon the question to whose account and risk the goods are shipped, whether they are liable to be condemned as prize. Commercial factories in a foreign country, which are free from the control of the government of that country, are considered as belonging to the country by which they are established, and the nationality of persons engaged therein is determined accordingly. But this exception does not apply where the government of the country has the control, although peculiar privileges are granted to the subjects of a particular nation. A foreign minister does not lose his domicile in his own country by residing in the foreign one to which he is accredited; but if he engages in trade there, he is, in respect to such trade, considered as a citizen of the country where it is carried on.—It sometimes occurs that circumstances will not permit property captured at sea to be sent into port. The captor in such a case may destroy it, or allow the master or

owner to ransom it. Such a contract is valid by the laws of nations, but it is prohibited in England by statute. By the ransom bill the vessel is protected from subsequent capture until she reaches her own country, or the country specified in the bill, provided there be no deviation from the course of the voyage. Generally some of the officers and crew are retained as hostages, and if they die, or the vessel is lost by a peril of the sea before her arrival in port, unless it is otherwise stipulated in the bill, the ransom is nevertheless due; for the captors do not insure either the safe arrival of the vessel or the lives of the hostages. If the vessel deviates and is afterward captured and condemned, the better opinion seems to be that the price of the ransom is to be deducted from the proceeds of the prize and given to the first captor, and the residue given to the second. If the captor himself should after the seizure be taken by an enemy's cruiser, together with the ransom bill, the ransom becomes part of the lawful conquest of the enemy, and the debtors of the ransom are consequently discharged from the contract under the ransom bill.—The right which a captor acquires by the seizure is an inchoate right merely, and is subject to be divested before condemnation. If there is a recapture, escape, or voluntary discharge of the property, a court of prize cannot proceed to adjudication. By the Roman law of *jus postliminii*, persons or things taken by the enemy were restored to their former state upon coming again into possession of the nation to which they had belonged. Formerly, as between the belligerents, the title to property captured passed after it had been in the possession of the captors 24 hours; and if after that time it was recaptured by third persons, they became the absolute owners of it. Now, however, the property of the original owners is not divested until condemnation, and the recaptors are merely entitled to salvage, the amount of which is in the United States fixed by statute for most cases, and when not so fixed is determined by the general principles of law. There is some conflict of authority whether the crew of a vessel who recapture it before condemnation are entitled to salvage. It would seem that in the United States they are not, because it is considered to be the duty of the crew to do all that they can to save the vessel until she is condemned. If a treaty of peace makes no particular provisions relative to captured property, it remains in the same condition in which the treaty finds it. In England, as between English subjects, the right of postliminary subsists to the end of the war, and foreign nations are treated with the same liberality which they accord in similar circumstances to England. The property of a subject or an ally engaged in commerce with the enemy is liable to capture; and it makes no difference whether the trade be direct or indirect. The law of nations permits vessels to sail and chase under false colors,

but not to fire a gun or capture under them.—It has become an established principle of the law of nations, that a nation which takes no part in a war shall have the same rights which it has in time of peace, except so far as the exercise of these rights would materially interfere with the permanent rights of the belligerents. Within her own territory, which for this and for other purposes extends a marine league from the shore, a neutral nation is supreme. No belligerent has a right to make a capture in her waters, or to arm or equip his ships of war in her ports, and if either of these things is done the neutral is bound to redress the injury. A ship has no right to station itself in a neutral port and send out boats to make hostile seizures. The neutral nation may allow certain privileges to one of the belligerents, but only such as she is willing to allow to the other. She cannot lend money to one belligerent, but if she is under a previous stipulation, made in time of peace, to furnish a given number of ships or troops to one of the belligerents, the contract may be complied with. If a prize is brought into a neutral port, the neutral government may exercise jurisdiction so far as to restore the property of its own subjects which has been illegally captured. And it has been held in the United States that foreign ships which offend against the laws of that country within its jurisdiction may be seized upon the ocean, and brought back for adjudication. In 1793 the government of the United States established rules of neutrality which it required foreign belligerent powers to observe in their intercourse with this country. Among others was one which provided that if an armed vessel of one nation should depart from our jurisdiction, no armed vessel within the same port and belonging to an adverse belligerent power should depart until 24 hours after the former. It is now a universally admitted principle of the law of nations that a belligerent has a right in time of war to visit and search all vessels on the ocean, in order to determine whether they or their cargoes are hostile or neutral. This right gives also as a necessary incident the right to seize and send in the vessel for adjudication, whenever its real character, or that of its cargo, is justly open to suspicion. The neutral must submit, and if her crew rise and endeavor to recapture the vessel, it is a hostile act, which subjects the vessel and cargo to condemnation. Neutral goods may be carried in a belligerent vessel even if the latter is armed, according to the law in the United States; and a neutral ship is not subject to seizure if she has belligerent goods on board. Attempts have been made at different times to engraft on the law of nations the principle that free ships make free goods, but the law remains unchanged, except as it has been modified by treaties between particular nations. The question whether a country, which during peace confines the trade of its colonies to its own subjects, can during war

open such trade to a neutral, has been much discussed. In England it has been held that it cannot; but this rule has been repudiated by the government of the United States. Neutrals are not permitted to carry goods which are contraband of war, or to enter a blockaded port. (See BLOCKADE, and CONTRABAND.) Breach of blockade forfeits the vessel, and in some cases the cargo; but according to the modern practice, the carrying of contraband goods only forfeits the goods, and the owner of the vessel loses merely his freight and expenses, unless the same person owns both ship and cargo, or some fraud appears in the transaction, in which cases both ship and cargo are forfeited. If an enemy's cargo is captured in a neutral vessel, the vessel has a claim on the captors for freight. But this rule is limited by the reason of it, and if the cargo be contraband, or the voyage be *quasi* contraband, then the neutral vessel loses its freight. The rule that freight is not earned unless the goods are carried to their destination, applies to capture. But if the captor takes the goods where they should have been carried, and even if he does this substantially though not precisely, as by bringing goods to Boston which were destined to New York, freight is due.—All seizures at sea are made at the peril of the captors. If, on being sent in, the vessel and cargo are acquitted, the captors are responsible for all damages and costs, unless the capture was made with probable cause. What is probable cause is a question of some difficulty, and depends very much upon the facts of each particular case. In general, if the papers appeared false or colorable, or were suppressed, mutilated, or spoliated; if the voyage were to or from a blockaded port; or if other circumstances of a like nature occurred, the captors would be justified in sending the vessel in for adjudication. After the vessel is captured, the captors are responsible for any loss which may occur by the negligence, fault, or misconduct of the prize officers and crew; but they are not responsible if a loss occurs from accident, stress of weather, recapture, &c.—While a ship is forfeited by the master's disguising belligerent property on board as neutral, without the authority, assent, or knowledge of the owner, this act does not operate as a breach of neutrality as to the goods on board which are actually neutral and proved to be so by proper documents, and belong to another owner than him who has forfeited the goods. If neutral interests or property are undistinguishably mixed up with belligerent interests or property, they become liable themselves to all the incidents and effects of a belligerent character. A resistance to search when rightfully demanded, an attempt at rescue, and seeking belligerent protection or receiving it, are all breaches of the duty of a neutral. Some question has arisen as to what is a rescue. It is the duty of the captors to put on board persons competent to navigate the vessel into port for

adjudication, and her own master and crew are not bound to do this. If the vessel is given up to them, and they pursue their original course against the wish of the captors, this is not a rescue. But if the neutral crew undertake and promise to navigate the vessel to the desired port for adjudication, and the vessel is given up to them for this purpose, and they violate their promise and take the vessel into their own hands for their own purposes, this is an unlawful rescue. Generally a cargo is considered as liable to condemnation if any act has been committed by the master which subjects the ship to condemnation. But the cargo is not liable to condemnation if it is the property of a person other than the owner of the ship, and its owner was not cognizant of the intended violation. If, however, the owner of the cargo gave the master discretionary power, he is liable for his acts; or if the cargo was loaded after notification of a blockade, the parties having full knowledge of the fact. Resistance to the right of search, the rescue or recapture of the ship by the master and crew, and the fraudulent suppression or spoliation of papers, affect the owner of the cargo as well as the owner of the ship. The principal grounds for condemning a ship as prize, where the question of nationality is in dispute, are: 1, the entire want of the necessary papers; 2, their destruction; 3, their material alteration or falsification; 4, the time when the papers were made out, as whether before or after the war, is often material; 5, next in importance is the conduct of the master and officers; 6, their prevarication or evident falsehood in the preliminary proof; 7, their refusal or inability to give a good account of the ship and cargo; 8, the domicile of the master and officers. The spoliation of papers, by which is meant, not merely their total destruction, but such falsification as makes them useless or worse as evidence, is a circumstance of grave suspicion, though it is open to explanation. Possession by an enemy is presumptive proof, though not conclusive, of hostile character. Ships are presumed to belong to the country under whose flag they sail; and it has been thought that this presumption should be conclusive as against the person using the flag. In joint captures all public ships of war in sight are presumed to assist, and therefore they are entitled to share in the proceeds; and this presumption extends to all the ships of a squadron united by authority for a specific purpose, as for a blockade for example, although not actually in sight; but it does not apply to privateers, because they are not obliged to capture all vessels they meet, as are vessels of war. Revenue cutters, as they are generally employed to protect the revenue, and have no special injunction to capture enemy's vessels, come under the same rule as privateers in this respect. Every ship is expected to have on board the necessary papers to establish her nationality; and these are the papers which the law of her own

country requires as evidence of that character. The same rule applies to cargoes. The sale of a ship or cargo under a decree of admiralty, founded on condemnation as prize, is valid and binding upon all courts and parties, unless it is shown to be vitiated by fraud. But where an attempt is made to establish a revolutionary government, which fails, the adjudications of its prize courts and the sales based upon them will not be recognized, as was held in the case of the late Confederate States.

PRIZE MONEY. The distribution of prize money, or of the proceeds of the sale of ships or goods adjudged by courts of admiralty to be good prize, is carefully regulated by statutes of the United States. The 10th section of the act of June 30, 1864, provides as follows: "The net proceeds of all property condemned as prize shall, when the prize was of superior or of equal force to the vessel or vessels making the capture, be decreed to the captors; and when of inferior force, one half shall be decreed to the United States and the other half to the captors: provided that, in case of privateers and letters of marque, the whole shall be decreed to the captors, unless it shall be otherwise provided in the commissions issued to such vessels. All prize money adjudged to the captors shall be distributed in the following proportions, namely: 1. To the commanding officer of a fleet or squadron, one twentieth part of all prize money awarded to any vessel under his immediate command. 2. To the commanding officer of a division of a fleet or squadron, on duty under the orders of the commander-in-chief of such fleet or squadron, a sum equal to one fiftieth part of any prize money awarded to a vessel of such division for a capture made while under his command, the said fiftieth part to be deducted from the moiety due to the United States, if there be such moiety, otherwise from the amount awarded to the captors: provided that such fiftieth part shall not be in addition to any share which may be due to the commander of the division, and which he may elect to receive as commander of a single ship making or assisting in the capture. 3. To the fleet captain, one hundredth part of all prize money awarded to any vessel or vessels of the fleet or squadron in which he is serving, except in case where the capture is made by the vessel on board of which he is serving at the time of such capture, and in such case he shall share in proportion to his pay with the other officers and men on board such vessel, as is hereinafter provided. 4. To the commander of a single ship, one tenth part of all the prize money awarded to the ship under his command, if such ship at the time of the capture was under the command of the commanding officer of a fleet or squadron, or a division, and three twentieths if his ship was acting independently of such superior officer. 5. After the foregoing deductions, the residue shall be distributed and proportioned among all others

doing duty on board (including the fleet captain), and borne upon the books of the ship, in proportion to their respective rates of pay in the service. No commanding officer of a fleet or squadron shall be entitled to receive any share of prizes captured by any vessel or vessels not under his command, nor of such prizes as may have been captured by any ships or vessels intended to be placed under his command, before they have acted under his orders; nor shall the commanding officer of a fleet or squadron, leaving the station where he had command, have any share in the prizes taken by ships left on such station after he has gone out of the limits of his said command, nor after he has transferred his command to his successor. No officer or other person who shall have been temporarily absent on duty from a vessel on the books of which he continued to be borne, while so absent, shall be deprived, in consequence of such absence, of any prize money to which he would otherwise be entitled. And he shall continue to share in the captures of the vessel to which he is attached until regularly discharged therefrom."

PROBATE, in law, the proof, before the competent authority, that an instrument offered purporting to be the last will and testament of a person deceased is indeed his lawful act. Until the act 20 and 21 Victoria, c. 77 (1857), amended the law relating to probates and letters of administration in England, the custody of the estates of all deceased persons vested there primarily in the ordinaries or bishops of dioceses, subject only to the exceptional rights of the crown or of lords in respect to certain manors. The new act of 1857 abolished the ancient ecclesiastical jurisdiction, and conferred full and exclusive authority over all testamentary causes upon the queen, to be exercised in her name in a court to be called the court of probate. Ecclesiastical courts never existed in the United States; but from the very settlement of the country the office and functions of the English ordinaries have been exercised here by similar officers under various titles, such as surrogate, register of wills, judge of probate, and ordinary, and generally with larger powers than those functionaries possessed. In some states the county courts, and in others the orphans' courts, grant letters of probate. These several judicatures have different powers, some only concerning themselves with the *factum* of a will, leaving its construction, or the operation and effect of its particular provisions, to the courts of law; but others are vested with complete jurisdiction of all matters pertaining to the administration, subject to appeal to some higher court. In England the rule has been that probate was necessary of such instruments only as were testamentary and regarded personal property. If they affected lands alone they needed not to be proved in the spiritual courts. In this country the general rule by statute is that no will is effectual to pass either real or personal estate unless

it has been duly proved and allowed in the probate court; and so long as the probate remains unreversed on appeal, the due execution of the will, the sanity or capacity of the testator, and the attestation of the witnesses, cannot be called in question in the courts of common law. The same rule is in some states observed in respect to wills once admitted to probate, though they were made and executed in other states according to forms not sufficient where they were approved. In some states the probate of wills of lands is *prima facie* evidence, but not conclusive, of the due execution of these instruments; in others the probate becomes conclusive in these respects after the lapse of a certain number of years.—In most of the states the procedure of the court upon probate is fixed by the legislature, and the common law distinction between probate in common form and in solemn form has in great measure disappeared. A will is said to be proved in common form when the executor presents it to the court, and, without summoning any of the parties interested, calls one or more witnesses to prove its execution. The objection to this mode of proof was, at common law, that at any time within 30 years the executor might be called upon by any party in interest to make proof in solemn form. Proof is made in solemn form, or by form of law or *per testes*, when all persons whose interests are to be affected by the will have been duly notified to be present, and have had opportunity to be heard in the premises. This is now the usual mode of proof in the United States, and after the will is approved in this way it is forever binding. The method of proof, however, like many other points of probate practice, is often regulated by particular statute provisions. The testimony which the judge calls for at the hearing relates to the *factum* of the will, as the phrase is. The question being whether the instrument is a will or not, it is of the first importance to inquire into the capacity of the testator, and whether he did in fact execute the alleged will as it purports to have been executed. It is to furnish evidence on both these points that disinterested persons are invited to witness the execution of a will. These attesting witnesses are then most essential parties in a question of probate. Generally all of them must be summoned if they are living within the process of the court; but if from death or absence from the country, or from incompetency arising since the attestation, any witness cannot be produced, the will may be proved by the others and by proof of the handwriting of the party who fails. If all are dead, or out of the court's jurisdiction, the handwriting of all must be proved; and probably in such a case the handwriting of the testator also. The attestation clause is generally framed with a regard to the requirements which the statutes of the state where it is made render essential to the valid execution of a will. If the evidence of the witnesses

shows plainly that these requirements were not followed, the presumption of a valid execution furnished by the recital of them is over-set; but if the subscribing witnesses have lost all recollection of the particulars of the transaction, the formal execution will generally be presumed and the will admitted to probate. Failure of memory on the part of one of the witnesses may often be supplied by the evidence of another or of the rest of them. In affixing his name, an attesting witness is regarded as certifying the capacity of the testator. His subsequent attempt to impeach the instrument by declaring that the testator did not execute the will with an intelligent and disposing mind is justly open to suspicion. Evidence of this character is not to be entirely rejected, though it avails little without the support of other testimony. When 30 years have passed since the death of the testator, a will is said to prove itself; the subscribing witnesses being presumed dead, the bare production of the instrument suffices. The will must however have come from a custody which forbids question of its genuineness, and be in other respects free from suspicion, or the genuineness must in some way be proved.—

Wills alleged to have been lost, destroyed, or mislaid, may be admitted to probate on proof of these facts, and on clear and satisfactory evidence of their contents. For a noted instance of this, see GAINES, MYRA CLARK.

PROBOSCIDIANS, a division of the old order of pachyderms, elevated by Owen into an order by themselves. They include the living elephant and the fossil mammoth and mastodon. They are characterized by the prolongation of the nose into a cylindrical trunk or proboscis, at the extremity of which are the nostrils. The proboscis is very flexible and sensitive, terminating in a finger-like prehensile lobe. Prof. Cope in the summer of 1872 discovered in the eocene of Wyoming several proboscidiens, of the genus *eoobasilus*, large and robust, seeming to connect the elephant with the rhinoceros and dinotherium. (See "American Naturalist" for December, 1872.)

PROBUS, Marcus Aurelius, a Roman emperor, born in Sirmium, Pannonia, about A. D. 230, assassinated there in 282. While he was very young the emperor Valerian raised him to the rank of tribune. He commanded successively the 3d and 10th legions, and served in Africa and Pontus, on the Rhine, the Danube, the Euphrates, and the Nile. Under Aurelian he reconquered Egypt, which had fallen into the hands of Zenobia; and the emperor Tacitus made him commander-in-chief in the eastern provinces. On the death of the emperor in 276 the armies of the East forced him to assume the imperial purple, and the death of his rival Florianus soon left him at the head of the Roman world. He recovered 70 towns from the Germans, destroyed 400,000 of the invaders, and drove the remainder across the Rhine. Penetrating into Germany, he exacted a heavy

tribute of grain, cattle, and horses, and a restitution of the property carried away from the Roman provinces, and made a levy of 16,000 recruits for the Roman army. He built a stone wall from the neighborhood of Neustadt and Ratisbon on the Danube to Wimpfen on the Neckar, and thence to the Rhine, nearly 200 m. He secured the frontier of Rhetia, crushed the power of the Sarmatians, admitted the Goths to an alliance, and took several castles from the Isaurians. He suppressed the rebellion of Saturninus, the commander of the eastern army, and the revolt of Bonosus and Proculus in the West, and returning to Rome celebrated a triumph. To maintain the discipline of his troops, he constantly employed them in active labor, and the hills of Gaul and Pannonia by their toil were enriched with vineyards. This system irritated the soldiers, and finally an unguarded remark, that the establishment of universal peace would render a standing army unnecessary, excited an insurrection in his camp near Sirmium, and Probus fled to a tower; but the troops forced his retreat, and put him to death. He was succeeded by Carus.

PROCESS, in law, a term which, in a large sense, signifies the whole proceedings in any action, civil or criminal, real or personal, from the beginning to the end. In a narrower and more technical sense, the term is applied to different stages of the procedure; as is seen in the terms original process, which includes those precepts or writs by which one is called into court; final process, or the forms of procedure by which judgment is carried into execution; and mesne process, which covers the proceedings between the other two, and embraces all proceedings properly so called, all writs for compelling the attendance of jurors or witnesses, and for other collateral purposes. Mesne and final process are sometimes collectively described by the term judicial process, because proceedings in these stages of an action were authorized immediately by the courts, and issued under the hands and seals of their presiding judges. Original process, on the other hand, was so called because it was founded on the original writ, which, issuing out of chancery, and bearing the *teste* of the sovereign, conferred jurisdiction on the court to which it was addressed, and founded its authority over the matter in controversy. In the strict technical sense, process is the means employed for bringing the defendant into court to answer to the action. The first step therefore in the ancient procedure was to give the defendant notice of the issue and pendency of the original writ. This notice was given ordinarily by summons, which was a warning to the party to appear at the return of the writ, and was served upon him by the sheriff or some of his messengers. If the defendant disregarded this monition, the next step was a writ of attachment, bidding the sheriff to take certain of his goods to be forfeited if he failed to appear, or to take the pledges of certain sureties of the

defendant, who should be amerced in case of his non-appearance. If the sheriff made return that the defendant had no goods whereby he could be attached, or if after attachment he failed to appear, the court issued a writ of *capias* commanding the sheriff to take the defendant's body. This writ and all others subsequent to it were called judicial, because, as we have already seen, they proceeded immediately from the court, and not from chancery. The proceedings before *capias* became in time merely formal, and it was usual to sue this out in the first instance upon a supposed return of the sheriff. The old and somewhat complicated and inconvenient process for the commencement of suits is now abolished in England, and a simple summons supplies the place. —The proceedings in civil suits vary in the different states of the Union, and frequently in different courts of the same state. In some states the old common law procedure, modified more or less by statute, is in use, while in others a code of civil procedure similar to that of New York has been adopted. (See CODE, vol. v., p. 10.) The necessary proceedings in the regular course of a civil suit in the New York supreme court, to which a defence is interposed, are as follows: 1. The service, by delivering a copy to the defendant personally, of a summons, which may or may not be accompanied with the complaint, and which requires answer to be made to the complaint within 20 days, and contains a notice, according to the nature of the suit, that in default of answer judgment will be taken for a specified sum, or that application will be made to the court for the relief demanded in the complaint. *a.* The service within 20 days on plaintiff's attorney by defendant's attorney of a notice of appearance in the suit, with a demand for a copy of the complaint. *b.* The service within 20 days by plaintiff's attorney on defendant's attorney of a copy of the complaint, setting forth the grounds of the suit and demanding the appropriate judgment. 2. The service within 20 days on plaintiff's attorney by defendant's attorney of a copy of the answer, containing a denial of the allegations of the complaint, or new matter, such as payment, constituting a defence to the plaintiff's claim. *c.* If the answer, as is sometimes the case, contains an affirmative claim against the plaintiff, the service within 20 days by plaintiff's attorney on defendant's attorney of a reply interposing a denial or defence to such claim. 3. The service by the attorney of either party desiring to bring on the case for trial, on the attorney for the other party, of a notice of trial at least 14 days before the beginning of the term of court for which the notice is given. 4. The filing with the clerk of the court, at least eight days before the beginning of the term, by the attorney giving notice of trial, of a note of issue containing certain particulars to enable the clerk to place the case on the calendar of the court.

5. The trial, with or without a jury according to the nature of the suit, when the case is reached in its order on the calendar. 6. The filing in the clerk's office by the attorney for the prevailing party of the judgment roll, consisting of a certified copy of the clerk's minutes taken on the trial and a statement of the judgment drawn up by the attorney, together with the summons, complaint, answer, &c. 7. The issuing by the attorney for the prevailing party of an execution to the sheriff, who returns the same within 60 days, satisfied or unsatisfied as the case may be. When the complaint is served with the summons, *a* and *b* are not required. There are numerous collateral and subsidiary proceedings which may, and some of which commonly do occur in a suit. The time for the service of papers may be extended by the court. When the losing party desires to appeal from the judgment, he must upon notice to the other party have a "case" settled by the judge, which shall present the question to be considered by the higher court. A notice of appeal must be served on the prevailing party by the appellant within 30 days after he shall have received written notice of the judgment, and he must also serve on the prevailing party printed copies of the case. Either party may serve on the other a notice of argument and file a note of issue, when the case is placed on the calendar of the appellate court and argument had and judgment entered in due course. The appeal in the first instance is to the general term of three judges, and from their decision another appeal may be taken in similar manner to the court of appeals. When the appellant desires all proceedings to enforce the judgment to be stayed pending the appeal, he must furnish an undertaking with sureties to the effect that he will pay the judgment with costs and damages if it be affirmed.—In the criminal law process applies in an extensive sense to all those instruments which are used by competent authority for the purpose of bringing a party into court, or of executing the judgment of the law upon him.

PROCLUS, a Greek philosopher of the Neo-Platonic school, born in Constantinople in A. D. 412, died in Athens in 485. In his childhood he lived at Xanthus in Lycia, afterward for several years in Alexandria, studying under the most eminent teachers, and before he was 20 years old removed to Athens. On the death of Syrianus he succeeded him in the school at Athens, and hence is sometimes called Diadochus (the successor). He adopted the ascetic system which became common in the later Neo-Platonic school, abstained almost entirely from animal food, refused to marry, spent his money freely in acts of benevolence, and observed numerous fasts and vigils. He worshipped the sun and moon, the spirits of heroes and philosophers, and even the spirits of the whole human race, and celebrated all important religious festivals, no matter of

what nation. In addition to his religious exercises, he delivered five lectures a day. He was distinguished as a mathematician and grammarian. His extant works consist chiefly of commentaries, principally on Plato. One of his original works is entitled "Twenty-two Arguments against the Christians," in which he endeavored to maintain the eternity of the universe. As a writer he is usually regarded as one of the clearest of his school, but as a philosopher his reputation has never stood high. There is no complete edition of his extant productions; the best is by Cousin (6 vols. 8vo, Paris, 1820-'27). Translations of several of his works have been made into English by Thomas Taylor.

PROCONSUL, a Roman magistrate who acted for the consul in the government of a province, and was almost always one who had previously been consul. The first proconsul was Q. Publius Philo, who in 327 B. C. was at the head of the army in the second Samnite war when his consular year closed, and was then continued in the function beyond his time because his recall would have destroyed the advantages already gained.

PROCOPIUS, a Byzantine historian, born in Cæsarea, Palestine, about A. D. 500, died about 565. He early removed to Constantinople, and became distinguished as an advocate. In 527 he was chosen secretary by Belisarius, and accompanied him in his wars against the Persians, the Vandals in Africa, and the Goths in Italy, where he had charge of the commissariat department, and was at the head of the fleet. Returning to Constantinople about 542, he received from the emperor Justinian the title of *illustris* and the position of senator, and in 562 was made prefect of the city. The most important work of Procopius is his elegant and interesting "History" of his own times in eight books. It has been translated into English by Sir Henry Holcroft (fol., London, 1653). Another work, entitled *Anecdota*, probably by Procopius, though the authorship is questioned, consists of a collection of anecdotes portraying, and here and there perhaps spitefully caricaturing, the morals of the Byzantine court. An English translation of it was published anonymously under the title of "The Secret History of the Court of the Emperor Justinian" (London, 1674). The best edition of Procopius's collected works is by Dindorf (3 vols., Bonn, 1833-'38).—See *Procopius von Cæsarea*, by Dahn (Berlin, 1865).

PROCOPIUS. I. Andrew, called the Great, a leader of the Hussites, born toward the close of the 14th century, died at Böhmisch-Brod, Bohemia, May 30, 1434. He was adopted and educated by his uncle, a nobleman in Prague, who travelled with him through France, Spain, Italy, and the Holy Land. On his return he received clerical orders, and at the outbreak of the Hussite war he joined the sectarians, rose to the rank of a captain, and relieved the besieged town of Lundenburg in Moravia. In

1423 he gained a victory at Kremsier, and in 1424, on the death of Ziska, the Taborites elected him their leader. In conjunction with other Hussite captains he devastated Austria, Franconia, Saxony, and Silesia. Procopius the Small joined him in 1427, and the concentration against them of German forces from all sides led to a general confederation of the various Hussite parties under his banner. With this considerable army he defeated the Germans, ravaged the whole of Silesia and Moravia, and penetrated as far as Presburg in Hungary. In 1429 he turned to the north and pillaged and destroyed everything before him in order to weaken the power of the Germans. In 1430 he led an army of about 75,000 men into Franconia and Lower Bavaria, burning about 100 towns and castles and more than 1,000 villages on his way. Cardinal Julian finally succeeded in gathering another army of German crusaders. Frederick of Brandenburg took the command, and occupied Bohemia; but when Procopius appeared with his forces, the Germans at once took to flight (Aug. 14, 1431). Procopius continued his devastations in Silesia, Hungary, and Saxony, but finally sold a truce of two years to Silesia and Saxony for large sums of money. In 1433 he attended the council of Basel, where he defended with much spirit the creed of his party, attacking especially the order of the monks, which he called an invention of the devil. Tired of the long disputations, he finally refused further to attend the council, and returned to Bohemia. Ten theologians and several princely legates were thereupon sent to Prague to continue the conference, and they succeeded in bringing about a compromise with the Calixtines. Procopius, not satisfied with the new articles of faith, besieged the city of Pilsen, and when the Calixtines had formally accepted the *Compactata* he turned his arms against them. The decisive battle was fought in the neighborhood of Böhmisch-Brod, E. of Prague, May 30, 1434, where Procopius was defeated and killed. (See HUSSITES.) **II. The Small**, the leader of the Hussite party of Orphanites, joined Procopius the Great in 1427, shared with him the conduct of the war, and died at his side.

PROCRUSTES (Gr. Προκρούστης, the stretcher), the surname of Polypemon or Damastes, a legendary robber of Attica, who had an iron bed upon which he placed all the travellers who fell into his hands. If they were longer than the bed, he cut enough from their limbs to make them fit; if they were shorter, he stretched them. He was slain by Theseus on Mt. Cephissus.

PROCTER. I. Bryan Waller, an English poet, better known by his anagrammatic pseudonyme of Barry Cornwall, born in London about 1790, died there, Oct. 5, 1874. He was educated at Harrow, passed some time in the office of a solicitor in Wiltshire, removed to London, and in 1831 was called to the bar from Gray's Inn.

For several years he was a commissioner in lunacy, resigning in 1861. His first publication was a volume entitled "Dramatic Scenes and other Poems" (1819), which was followed by "Marcian Colonna, an Italian Tale; with three Dramatic Scenes, and other Poems" (1820); "A Sicilian Story, with Diego de Montilla and other Poems" (1820); "Mirandola, a Tragedy" (1821); "The Flood of Thessaly and other Poems;" "Poetical Works" (3 vols., 1822); "Effigies Poeticæ" (1824); "English Songs and other Small Poems" (1832); "Life of Edmund Kean" (1835); "Essays and Tales in Prose" (1851); and "Charles Lamb, a Memoir" (1866). His "Mirandola" was produced with success at Covent Garden in 1821. He is best known by his songs, some of which are singularly well adapted to music, and are equally refined in sentiment and diction. All his publications appeared under his assumed name of Barry Cornwall. **II. Adelaide Anne**, a poetess, daughter of the preceding, born in London, Oct. 30, 1825, died there, Feb. 2, 1864. She published "Legends and Lyrics, a Book of Verse" (1858), and "A Second Volume of Legends and Lyrics" (1860). Both series with new poems appeared in one volume in 1865, with an introduction by Charles Dickens.

PROCTOR (Lat. *procurator*, agent), in a general sense, one who is commissioned to manage the business of another. In a particular sense, a proctor is one who is commissioned to transact the business of his principal in the ecclesiastical or admiralty courts. He discharges functions similar to those of attorneys and solicitors in other courts. In England, the proctor can be admitted to practice only after a clerkship of seven years with a senior proctor of at least five years' standing, and he must produce a certificate of considerable proficiency in classical education. Before the abolition of the probate and matrimonial courts of doctors' commons, the proctors were the only persons allowed to practise in them. (See **DOCTORS' COMMONS**.) Proctors are known in the United States only as officers of the courts of admiralty, whose duties, authority, and responsibilities correspond to those of attorneys at law.—The name proctor is also given in England, and in some American colleges, to university officers whose duty is to guard morals and order.

PROCTOR, Richard Anthony, an English astronomer, born in Chelsea, March 23, 1837. He was educated at home until his 11th year, and then entered an academy in Milton-on-Thames, where he remained three years and became head boy of the institution. After the death of his father in 1850 the family became embarrassed through chancery delays in a friendly suit, and in 1854 Richard accepted a clerkship in a London bank, devoting all his spare time to the study of mathematics. In 1855, the situation of the family having been improved, he entered King's college, London, and in 1856 St. John's college, Cambridge. He took his

degree in 1860, and married in the same year. For the next three years his studies were mostly historical and literary. In 1863 he wrote an essay on "Double Stars," which appeared in the "Cornhill Magazine." In 1865 he published a monograph on "Saturn," and early in 1866 his "Gnomonic Star Atlas" and "Handbook of the Stars." These works were of a scientific, but not popular nature. In 1866, by the failure of a bank in London, he lost the whole of his fortune, and his scientific work was considerably hampered by duties arising from this circumstance. In 1869 he made some suggestions to the astronomer royal, Sir George Airy, as to the best method of observing the approaching transit of Venus; and at a meeting of the principal astronomers of England at the Greenwich observatory in 1873 his views were unanimously approved. But his chief scientific work since 1867 has consisted in the investigation of the evidence available for determining the structure of the stellar and nebular universe. (See **STAR**.) In 1870 Mr. Proctor published a work entitled "Other Worlds than Ours," which had an extraordinary success and attracted the general attention of the scientific world. From that time he has been perhaps the most fertile and popular writer upon astronomical subjects of the present day. In 1873 he visited the United States and delivered lectures, and again in 1875. His published books besides those above mentioned are: "Constellation Seasons" and "Sun Views of the Earth" (London, 1867); "Half Hours with the Telescope" (1868); "Half Hours with the Stars" (1869); "The Sun," a large "Star Atlas," "Elementary Astronomy," and "Light Science for Leisure Hours" (1870); "Essays on Astronomy" and "Orbs Around Us" (1871); "Chart of 324,000 Stars," "School Atlas of Astronomy," and "Elementary Physical Geography" (1872); "Light Science," &c., second series, "The Moon," and "Border Land of Science" (1873); and "The Universe and Coming Transits," "Transits of Venus, Past, Present, and Future," and "The Expanse of Heaven" (1874).

PROFET. See **OYER**.

PROHIBITION, a writ issued by a superior court to restrain the action of an inferior tribunal which is assuming to act in some matter not within its cognizance, or in disregard of the rules which govern the exercise of its jurisdiction. It is an extraordinary remedy, to which resort seldom becomes necessary.

PROJECTILES. See **GUNNERY**.

PROKESCH-OSTEN, Anton von, a German author, born in Gratz, Dec. 10, 1795, died Oct. 26, 1876. He served in the army, taught mathematics, and was secretary to Prince Schwarzenberg, whose *Denkwürdigkeiten* he edited in 1822. For his subsequent services in the East he was ennobled with the name of Von Osten, and he was afterward made privy councillor and general. He was ambassador at Athens 1834-'49, Berlin 1849-'52, Frankfort 1853-'5, and

Constantinople 1855-'67, and nuncio at Constantinople 1867-'72. His celebrated collection of coins was bought by the Prussian government in 1875 for the museum of Berlin, for \$150,000. Among his works are: *Erinnerungen aus Aegypten und Kleinasien* (3 vols., Vienna, 1829-'31); *Denkwürdigkeiten und Erinnerungen aus dem Orient*, edited by E. Münch from Prokesch's correspondence with Schneller (3 vols., Stuttgart, 1836-'7); *Kleine Schriften* (7 vols., 1842-'4); and *Geschichte des Abfalls der Griechen vom türkischen Reich* (6 vols., Vienna, 1867-'8).

PROME, a town of British Burmah, in Pegu, on the E. bank of the Irrawaddy, 166 m. N. N. W. of Rangoon; pop. about 30,000. It is surrounded by a brick wall $1\frac{1}{2}$ m. in circumference, has several paper manufactories, and is a place of considerable commercial importance. A railway is projected to Rangoon. In the suburbs are extensive rice grounds. Prome was taken by the British in 1825, and again in the second war with Burmah in 1852. It was nearly destroyed by fire in 1856, and in the same year suffered seriously from an inundation of the Irrawaddy.

PROMETHEUS, in Grecian mythology, the son of Japetus and Clymene, and brother of Atlas, Menœtes, and Epimetheus. According to Hesiod, gods and men were in a dispute at Mecone in regard to what portion of the animal should be offered in sacrifice. Prometheus, as the tutelary representative of man, divided a bull into two parts, one consisting of the flesh and intestines wrapped in the skin, and the other of the bones covered up by the white fat. Jupiter, having been asked which of the two he would choose, decided for the latter; and as the choice could not be revoked, those parts alone were thereafter offered on his altar. Indignant at the deception, he withheld fire from mortals, but Prometheus stole fire from heaven in the hollow of a tube. Jupiter now sent Pandora to earth with her box of evils, and fastened Prometheus to a pillar, where he remained for many generations, an eagle every day feeding upon his liver, which every night grew again. At length Hercules was permitted to kill the eagle and free the prisoner. The most celebrated drama founded upon this myth is the trilogy of Æschylus, of which the "Prometheus Bound" and a few fragments of the "Prometheus Loosed" are extant. In Æschylus, Prometheus appears not only as the protector of the human race against the superior might of the gods, but as its teacher and benefactor. Through his assistance, Jupiter overcomes the Titans; but when Prometheus frustrates the design of destroying mankind, he is chained to a rock in Scythia. There he is visited by the Oceanids and by Io, to whom he foretells her long wanderings. He is in possession of knowledge which it is essential to the safety of Jupiter to gain; but he bids defiance to his persecutor, and refuses to make known the secret. He is hurled into Tartarus, and

afterward reappears chained to Mount Caucasus, to undergo fresh torments. From this condition he can only be freed when some other god shall voluntarily descend into Tartarus for him, which finally happened when Chiron, wounded by Hercules, sought permission to go into Hades. Another account says that Jupiter himself delivered Prometheus when the latter agreed to reveal the prophecy, according to which, if he were married to Thetis, she would give birth to a son greater than himself.

PROMISSORY NOTE, a promise in writing to pay money. When the promise is to pay it to the payee or his order, or to the bearer, the note is negotiable, and, as an exceedingly useful and important instrument of business, it is governed by a system of law which is quite peculiar. When not payable to order, or not negotiable, the rules of law applicable to it vary but little from those which are in force generally in relation to written contracts. (See EXCHANGE, BILL OF, and NEGOTIABLE PAPER.)

PRONG HORN. See ANTELOPE.

PROPAGANDA, or *Congregatio de Propaganda Fide* (congregation for propagating the faith), a board of 25 cardinals founded at Rome in 1622 by Gregory XV. for the support and direction of foreign missions. It has a secretary, who is generally a bishop or archbishop, and priests, advisers, and under secretaries, who hold a consultation weekly. The cardinal prefect of the propaganda is the pope's representative in all matters concerning the affairs of foreign missions, including the final appointment of all bishops in missionary countries. Pope Urban VIII. in 1627 added to the congregation a college for the education of missionary priests, where young men from every country in the world, with the exception of strictly Catholic countries, were educated, and ordained for the missionary work among their fellow countrymen. A celebrated polyglot printing establishment was attached to the propaganda, and besides a full corps of professors, it possessed a museum of antiquities and curiosities, a handsome church, and a large library. This college was suppressed in 1873, and its property was sold by auction.

PROPAGATION OF THE FAITH, *Society for the (la société pour la propagation de la foi)*, a Roman Catholic society in aid of foreign missions founded at Lyons in 1829. Its plan is to raise, through committees and sub-committees, one cent a week from each subscriber, the money being forwarded to the central committee at Lyons, by whom the funds are apportioned to bishops of the various missionary countries throughout the world. The society spread rapidly over the whole of Europe, and has now paying members in almost every country in the world. It is sometimes confused with the Roman propaganda, with which it has nothing in common except a similar object. The central committee at Lyons publishes six times a year the *Annales de la pro-*

pagation de la foi, to inform the subscribers of the use made of the funds and of the progress of the missionary work.

PROPERTIUS, *Sextus Aurelius*, a Roman poet, born in Umbria about 50 B. C. He was rich until an agrarian division, in 36 B. C., reduced his fortune. He wrote four books of elegies, principally addressed to his mistress. The text of Propertius as we have it is exceedingly corrupt. One of the best editions is that of Hertzberg (2 vols. 8vo, Halle, 1843-'5). His elegies have been translated into English verse by Charles Robert Moore (Oxford, 1870).

PROPHECY (Gr. *προφητεία*, from *προφάναι*, to foretell), the prediction of future events. The belief that certain men or classes of men had the faculty of prediction can be traced to the remotest antiquity; and the priesthood in particular were regarded as being endowed with it. But the term prophecy, in this sense, is generally restricted to the Old Testament theology. The word prophet in the languages of Christian nations is derived from the Greek *προφήτης*, by which the Septuagint renders the Hebrew *nabi*. But the term of the Septuagint does not fully correspond to the primary meaning of the Hebrew word, which denotes a man speaking by divine inspiration; though sometimes the word is used in a bad sense of men who only pretend to inspiration, or are inspired of an evil spirit.—The prophets of the Old Testament appear as the privileged organs of communication between God and his people. Frequently, though for the most part indefinitely, they pointed to a glorious completion of the theocracy through a great descendant of David, the Messiah. They also acted as the interpreters of the law, and were guardians of the rights of the oppressed. Their mission, as a body of extraordinary teachers, became especially important in times when the ordinary guardians of the law, the priests, sided with the apostates and idolaters. The germ of the prophetic office is found in the Mosaic economy, but the order was formally developed by Samuel, when the moral decline of the nation had made it necessary. In the age of the judges, prophecy, though existing only in scattered instances, exerted a powerful influence. But the conspicuous prophetic agency begins with Samuel, who founded schools of the prophets at Gibeah, Ramah, Bethel, Jericho, and Gilgal. Instruction was given in the interpretation of the divine law, and in music and sacred poetry. Samuel, Elijah, and Elisha are mentioned as principals of such institutions. The pupils are frequently called the "sons of the prophets." The prophets were mostly taken from these schools, yet not always; for Amos relates of himself that he had been trained in no school, but was a herdsman when the Lord took him to prophesy unto the people of Israel. Sometimes, but rarely, it occurred that women came forward as prophetesses. The golden era of the prophets extends from the time of Samuel to the Babylonish captivity, and hardly

any important event happened in which they did not appear as performing the leading part. After the time of Samuel they often held weekly and monthly meetings for teaching, that work being tacitly transferred from the priests to the prophets. About 100 years after the return from the Babylonish captivity the prophetic profession ceased, and Haggai, Zechariah, and Malachi are uniformly mentioned by Jewish tradition as the last of the prophets.—The manner of life of the prophets was conspicuous for strictness, austerity, and asceticism. Some of them appear to have been in possession of considerable physical and medical knowledge, and to have occasionally made use of it. Later they often wrote down their prophecies, and many others compiled historical works. Thus Gad, Nathan, and perhaps Samuel, wrote the history of David; Nathan also the history of Solomon; Shemaiah and Iddo the history of Rehoboam; Jehu the history of Jehoshaphat; and Isaiah the history of Uzziah and Hezekiah.—The New Testament mentions the power of prophecy as one of the gifts of the Holy Spirit. We read of one prophet, Agabus, who predicted the famine under Claudius and the imprisonment of Paul; but generally a foreknowledge and foretelling of futurity is not mentioned as characteristic of those men who, as Barnabas, Judas, and Silas, are called prophets in the Acts and the Pauline epistles. The object of the Christian "prophecy" was, according to 1 Cor. xiv. 3, "edification and exhortation and comfort." Among the books of the canon of the New Testament only one, the Revelation, bears a prophetic character.—The mode in which the divine will was revealed to the prophets has been the subject of much discussion. The Bible declares that sometimes God spoke to them in an audible voice, sometimes in dreams, sometimes by giving them an ecstatic elevation in which they saw truths ordinarily unseen, and sometimes by visions. Many writers, especially since the middle of the last century, have endeavored to show that the Scriptures do not assert a direct and miraculous supernatural interference, and that the prophetic inspiration can be explained by a high degree of religious enthusiasm and ecstasy. Among these writers are Eichhorn, *Die Hebräischen Propheten* (3 vols., Göttingen, 1816-'20); Knobel, *Der Prophetismus der Hebräer* (Breslau, 1837); Ewald, *Die Propheten des Alten Bundes* (Stuttgart, 1840); and Dr. Williams in the Oxford "Essays and Reviews." With regard to the predictions occurring in the books of the prophets, this class of writers either ascribe them (as Bunsen did) to a kind of spiritual clairvoyance, or they maintain (with Dr. Williams) that few if any passages can be claimed as strictly prophetic, the prophetic utterance containing only certain "deep truths and great ideas." The great majority of Christian theologians maintain that this view is opposed by the plain intent of the

Old Testament, by the counter testimony of Christ and the apostles in the New, and also by the concessions of unbelieving interpreters, such as Strauss, who say that the Scriptural writers undoubtedly claim prophetic inspiration, but that the claim is absurd. Among the works written from this standpoint are Prof. Fairbairn's treatise on "Prophecy, its Nature and Functions" (8vo, Edinburgh, 1856), and especially Tholuck, *Die Propheten und ihre Weissagungen* (Gotha, 1860), who has reviewed the whole subject in a philosophical manner, and concludes that the prophecies cannot be interpreted "as the utterance of subjective religious aspirations," and that "the very course of history has impressed upon these declarations the stamp and confirmation of an objective and supernatural inspiration." The reader may also consult various commentaries on the books of the prophets, and that class of works which limit themselves to an interpretation of the "Messianic prophecies" throughout the entire Old Testament, among which Hengstenberg's *Christologie* (3 vols. 8vo, Berlin, 1829-'35; English translation, 1836-'9, and in Clark's "Foreign and Theological Library," 1854) is the best known.—Besides the works already named, see Köster, *Die Propheten des Alten und Neuen Testaments* (Leipsic, 1838); Davison, "Discourses on Prophecy" (Oxford, 1839); Stuart, "Hints on the Interpretation of Prophecy" (Andover, 1844); Maurice, "Prophets and Kings of the Old Testament" (1853); Pusey, "The Minor Prophets" (Oxford, 1861); R. Payne Smith, "Messianic Interpretation of the Prophecies of Isaiah" (1862); and Stanley, "Lectures on the Jewish Church" (1863).

PROPHETS, Books of the, a division of the Old Testament. The rabbis divided the books of the Hebrew canon into three classes: 1. *Torah*, law; 2. *Nebiim*, prophets; 3. *Kethubim*, writings, hagiographa. The second class was subdivided by them into "former" and "latter" prophets. The former comprised the books of Joshua, Judges, Samuel, and Kings. Among the latter they again distinguished between the three "great" (Isaiah, Jeremiah, and Ezekiel) and the twelve "minor" prophets (Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, and Malachi). In the arrangement of modern Biblical criticism, Joshua, Samuel, and Kings are not counted among the books of the prophets, who are divided into the four great (Isaiah, Jeremiah, Ezekiel, and Daniel) and the twelve minor prophets.—See also the articles on the several prophets.

PROPONTIS. See MARMORA, SEA OF.

PROSERPINE, or *Persephone*, in Greek and Roman mythology, the queen of the infernal world. She was the daughter of Jupiter and Ceres, and was beloved by Pluto, who forcibly carried her off to Hades. There she was found by Ceres, who induced Pluto to consent that her daughter should pass six months of

every year in the upper world with her; and hence Proserpine became a symbol of vegetation. The Eleusinian mysteries belonged to her in common with her mother, and she had temples at Corinth, Megara, and Sparta, and at Locri in the south of Italy.

PROSPER (AQUITANUS), Saint, a church father of the 5th century, born near Bordeaux about 403, died about 464. He was distinguished as a chronologist, poet, and theologian, and is chiefly known from the prominent part taken by him in opposing Cassian and the Semi-Pelagians of Marseilles. Among the many works written by him against these and in defence of St. Augustine is the *Carmen de Ingratis*, considered to be one of the best Latin poems written by a Christian author. It is asserted, but on doubtful authority, that he became in 440 secretary or *notarius* to Leo the Great, and that he wrote the letters on Eutychianism attributed to that pope. He drew up about 444 a paschal cycle of 84 years, which has perished, and a continuation of the chronicle of St. Jerome, from A. D. 379 to 455, under the title of *Chronicon Consulare*. Photius ascribes the final overthrow of Pelagianism to his unwearied labors. His feast is celebrated on June 25. St. Prosper appears to have lived and died a layman, though some writers have made him bishop of Riez (Rhegium) in Provence. There are several complete editions of his works, the best being those of Maugeant, with a history of his life, translated from Tillemont (fol., Paris, 1711), and Foggini (fol., Rome, 1752), reprinted in vol. li. of Migne's *Patrologie latine*.

PROSTATE GLAND (Gr. *προστατήν*, to stand before), a solid, chestnut-shaped glandular body, rather more than one inch in diameter, situated in the male between the neck of the bladder and the membranous portion of the urethra; so called because it stands in front of the neck of the bladder. The texture of the prostate gland consists of a large number of racemose or compound glandules, surrounded by and imbedded in an abundant fibro-muscular tissue, and opening by several separate orifices into the first or prostatic portion of the urethra, which canal it embraces at this point for about an inch. The prostate is liable to become enlarged in advanced life, when it sometimes creates an obstacle to the evacuation of the urine.

PROTAGORAS, a Greek philosopher, born in Abdera probably about 480 B. C., died about 411. The common story in regard to his origin was that he was a porter, and by the skillful manner in which he carried his load attracted the attention of Democritus, who undertook to educate him. He was the first who assumed the title of sophist, as denoting one who instructed others in the art of becoming wise, and in the arts of eloquence and politics, and was also the first who received pay for his lessons. According to Plato, he received more money during the 40 years in which he

taught than Phidias and 10 other sculptors. None of his works are extant. For saying, in his treatise "On the Gods," "Respecting the gods, I am unable to know whether they exist or do not exist," Protagoras was banished from Athens, and his books were burned.

PROTAIS, Paul Alexandre. See supplement.

PROTECTOR, in English history, a title several times conferred by parliament upon the chief officer of the kingdom during the king's minority, in place of that of regent. The most celebrated protectors were John, duke of Bedford, and Humphrey, duke of Gloucester, in the minority of Henry VI.; Richard, duke of Gloucester, whose protectorate ended in his becoming king as Richard III. after the death of Edward V.; and Edward Seymour, duke of Somerset, in the minority of his nephew Edward VI. Oliver Cromwell, as well as his son Richard, bore the title of lord protector.

PROTEIDS. See PROTEINE.

PROTEINE (Gr. *πρωτος*, first), a name given by Mulder to a product obtained by the action of potash on albuminoids, such as fibrine, albumen, and caseine, of which he considers it the base, the other factor being varying quantities of sulphimide, $(\text{NH}_2)_2\text{S}$, and phosphimide, NH_2P . It has, however, never been procured free from sulphur, and Liebig regarded Mulder's theory as not established, considering it only an albuminous substance somewhat modified. But the bodies of which Mulder considered it the base are commonly called proteine bodies, or proteids, and are divided, according to Hoppe-Seyler, into seven classes, viz.: 1. Albumens (soluble in water): *a*, serum albumen; *b*, egg albumen. 2. Globulines (insoluble in water, but soluble in dilute acids and alkalies, and very dilute solutions of chloride of sodium and other neutral salts): *a*, myosine; *b*, globuline; *c*, fibrinogen; *d*, vitelline. 3. Derived albumen (insoluble in water and solutions of chloride of sodium, but soluble in dilute acids and alkalies): *a*, acid albumen; *b*, alkali albumen or caseine. 4. Fibrine (insoluble in water, sparingly soluble in dilute acids and alkalies and in neutral saline solutions). (See FIBRINE.) 5. Coagulated proteid, formed by heating neutral solutions of proteids, or by the action of alcohol. 6. Amyloid substance, or lardaceine, a substance deposited in the liver and other organs in certain diseases. 7. Peptones, bodies formed from albuminous substances by the action of the gastric juice; they are found only in the stomach and small intestines, disappearing as soon as they enter the lacteal vessels.

PROTESILAUS, a legendary Thessalian prince, the first Greek slain in the Trojan war. It is said in the Iliad that he was the first who leaped from the ships upon the Trojan shore, and according to the ancient tradition recounted in Lucian he was killed by Hector. The great affection toward Protesilaus of his wife Laodamia is celebrated by the poets. After his death she prayed to be permitted to converse with him only for the space of three

hours; the prayer being granted, Mercury conducted Protesilaus to the upper world, and when he died a second time his wife died with him.

PROTEST (Lat. *protestari*, to testify or declare against), a term used in many ways and for many purposes. One who is called upon to pay an import duty, a tax, a subscription, or the like, which he thinks he ought not to be required to pay, but is unwilling to encounter the delay and expense of a lawsuit at that time, pays the sum demanded under protest; that is, he accompanies the payment by a written and attested declaration of what he deems the illegality of the demand, and of his rights of defence and denial. This protest preserves all those rights; and in any subsequent suit or other effort to get the money back, the protest will prevent him from being impeded by his payment.—In legislation, the members of a deliberative body who dissent from the views of a majority, and have no power to prevent those views from going into effect, sometimes ask leave to put on the record of the body a declaration of their views, drawn up and signed by them. This is called their protest against the measure; and leave to record it is usually given, if it is decent and temperate in its terms, and does not state what the majority regard as wilfully false or impertinent.—If a vessel is wrecked, or meets with other injury from any peril of the sea, it is an ancient and nearly universal custom for the master, on his arrival at port after the injury, to appear before a competent magistrate, and enter his protest against the accident or peril. In this protest he details the circumstances with sufficient fulness to sustain his declaration that the injury occurred, not through the fault of the vessel, but by reason of the peril stated. In the absence or disability of the master, the protest is made by the officers, or even by the seamen; and when it is made by the master, he is usually accompanied by one or more of the officers, and by some of the seamen.—A very important use of protest is made in the case of dishonored bills of exchange. (See EXCHANGE, BILL OF.) It is a universal law that a foreign bill of exchange, if not accepted, or if not paid at maturity, must be protested in order to hold all the parties to it. In this sense, the states of the Union are foreign to each other. Inland (or domestic) bills and promissory notes are often protested in the same way; but this usage, so far as it exists, has grown up from the convenience of it, and not from any requirement of the law merchant. The protest should be made by a notary public; and full faith is given in all countries to all the official acts verified by his seal, which acts are required by law merchant. He cannot properly delegate this power to any clerk or substitute. An acceptance or payment *supra* protest takes place when, a bill having been protested, a third person intervenes, and accepts or pays the bill for the honor of the party whose duty it was to accept or pay it;

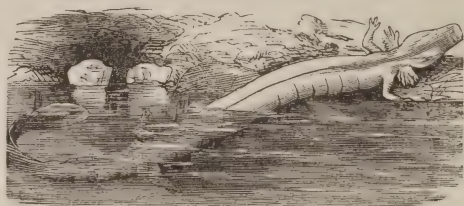
and this gives him a right to indemnity from the person for whom he accepts or pays. An acceptance or payment *supra* protest is sometimes called an acceptance or payment for honor. Generally, where one accepts or pays for honor without designating for whose honor he acts, it will be deemed that he acts for all who were bound by the paper, and he acquires his right of indemnity against all whom he thus protects. But he may designate, if he chooses, the party for whose honor he acts, and then he protects only that party, and has no claim or rights against any other.

PROTESTANT, a collective name for a large body of Christian denominations, embracing in general all except the Roman Catholic and eastern churches. The name originated in 1529 in Germany, at the diet of Spire. The majority of the members of the diet, in union with the representative of the emperor, had passed a resolution that those estates which had shown themselves favorable to the reformation should prohibit, until the convocation of an oecumenical council, all further innovations in religious matters, and in particular should not allow any alteration in the celebration of the Lord's supper or the mass. To this resolution the evangelical estates, consisting of the elector of Saxony, the margrave of Brandenburg-Anspach, the duke of Brunswick-Lüneburg, the landgrave of Hesse, the prince of Anhalt, and 14 imperial cities, refused to submit. They declared their readiness to obey the emperor and the diet in all "dutiful and possible matters;" but against any order considered by them repugnant to "God and his holy Word, to their souls' salvation and their good conscience," they entered, on April 19, a solemn protest. Henceforth they were called Protestants. The signers of the first protest did not fully agree in all their theological views; but they did agree in the protest against the authority of secular or ecclesiastical boards to compel obedience in matters of faith, and the name Protestant therefore came early into use as the collective name for all the Christian denominations in Switzerland, France, England, Scotland, Holland, and other countries which proclaimed the Bible to be the only rule of faith. (See Hauff, *Die protestantische Kirche in Deutschland*, Munich, 1861; Schenkel, *Das Wesen des Protestantismus*, 2d ed., Schaffhausen, 1862; Frank, *Ueber die Geschichte der protestantischen Theologie*, 2 vols., Leipsic, 1862-'5; De Félice, *Histoire des protestants de France*, Paris, 1870; and Wylie, "History of Protestantism," London, 1874 *et seq.*)—Protestantism is the predominant religion in all the countries of the Teutonic race, excepting the German provinces of Austria; in the United States of America, the German empire, Great Britain, Holland, Denmark, Sweden, Norway, Switzerland, and most of the colonial possessions of these states. The aggregate population connected with or under the influence of Protestant churches at the

close of 1874 is estimated in Schem's "Statistics of the World" (3d ed., 1875) as follows:

DIVISIONS.	Protestants.	Total population.
America.....	83,000,000	84,500,000
Europe.....	71,800,000	801,600,000
Asia.....	1,800,000	798,000,000
Africa.....	1,200,000	202,500,000
Australia and Polynesia..	2,200,000	4,400,000
Total.....	110,000,000	1,391,000,000

PROTEUS (Laurenti), or *Hypochthon* (Merr.), a perennibranchiate batrachian reptile, belonging to the same family as the axolotl and the menobranchus. The skin is naked and slimy, the body elongated and cylindrical, and the tail short, broad, and compressed laterally; the branchial tufts are three pairs, and persistent during life; legs four, rather weak, the anterior three-toed and the posterior four-toed. The common proteus (*P. anguinus*, Laur.) is about a foot long and half an inch in diameter; it is pale flesh-colored or white, with the branchial tufts bright crimson; the teeth are small and sharp, in both jaws and on the palate; the head triangular, and the snout obtuse; the eyes are very small, and without lids. It is found only in the subterranean waters of some caves of Europe, as in Carin-



Proteus anguinus.

thia and Tyrol, and especially in the Adelsberg cavern in Carniola. The respiration is essentially aquatic by means of the branchial tufts, though it has rudimentary lungs, rises to the surface to swallow air, and can live a short time out of the water, like the menobranchus; its motions by means of the legs are sluggish and awkward, but it swims rapidly and with ease by lateral undulations; when the water of its subterranean retreat becomes low, it buries itself in the mud; the food consists of aquatic worms and insects, and soft-shelled mollusks. Several local varieties occur, generally referred to the same species; one of these is purplish with yellow spots, and larger, widely extended, and coarsely divided gills; these are described as species of *hypochthon* by Fitzinger in the *Sitzungsberichte* of the academy of Vienna for October, 1850. (See **MENOBRANCHUS**.)

PROTEUS, in Greek and Roman mythology, a sea god subject to Neptune, whose flocks he tended. At midday he always arose from the flood and slept in the shadow of the rocks on the coast, and those who desired him to foretell the future were obliged to seize him at

that time. He would assume various shapes to terrify or disgust, and thus drive away his questioner; but when he found this subterfuge of no avail, he would yield to the demand.

PROTOGENES, a Greek painter, flourished toward the close of the 4th century B. C. He was born at Caunus in Caria, and for 50 years lived unnoticed and poor at Rhodes, until through the intervention of Apelles the Rhodians became aware of his merit. When Demetrius Poliorcetes besieged the city, he was careful not to attack the most defenceless part, because it contained the works of Protogenes. He spent so much time on his works, that Apelles said he never knew when to take his hand off. The "Ialysus" was considered his masterpiece, and this when Pliny wrote was preserved in the temple of Peace at Rome. Protogenes was also a statuary, and according to Suidas wrote on art.

PROTOPHYTES. See PROTOZOA.

PROTOPLASM (Gr. *πρῶτος*, first, and *πλάσμα*, form), a term applied to the supposed original substance from which all living beings are developed, and which is the universal concomitant of every phenomenon of life. All that is comprehended for brevity under the term life, whether the growth of plants, the flight of birds, or a train of human thought, is thus supposed to be caused by corporeal organs which either themselves consist of protoplasm, or have been developed out of it. Wherever nutrition and propagation, motion and sensation exist, there is as their material basis this substance designated in a general sense as protoplasm. The proof of it is held to be furnished by the protozoans called moners, the whole completely developed body of which consists solely of protoplasm. They are not only the simplest organisms with which we are acquainted, but also the simplest living beings we can conceive of as capable of existing; and though their entire body is but a single, formless, small lump of protoplasm, and (each molecule of it being like the other) without any combination of parts, yet they perform all the functions which in their entirety constitute in the most highly organized animals and plants what is comprehended in the idea of life, namely, sensation and motion, nutrition and propagation. By examining these moners we shall gain a clear conception of the nature of protoplasm, and understand the important biological questions connected with the theory. Some moners live in fresh water, and others in the sea. They are as a rule invisible to the naked eye, but some are as large as the head of a pin and may be distinguished without the aid of a microscope. When completely at rest a moner commonly assumes the shape of a simple sphere. Either the surface of the body is quite smooth, or numerous exceedingly delicate threads radiate from it in all directions. These threads are not permanent and constant organs of the slime-like body, but perishable continuations of it, which

alternately appear and disappear, and may vary every moment in number, size, and form. For this reason they are called false feet or pseudopodia. Nevertheless, by means of these pseudopodia the moners perform all the functions of the higher animals, moving them like real feet either to creep, climb, or swim. By means of these sticky threads they adhere to foreign bodies as with arms, and by shortening or elongating them they drag their own bodies after them. Each thread, like the whole body, is capable of being contracted, and every portion of it is as sensitive and excitable as the entire form. When any point on the surface of the body is touched with the point of a pin, or with another body producing a chemical alteration, as for example a small drop of acid, or when a current of electricity is passed through it, the threads are drawn in, and the entire body contracts into the form of a spherical lump. The same threads perform also the function of providing alimentation. When a small infusorium or any other nutritive particle comes accidentally in contact with the extended pseudopodia, these run quickly over it like a fluid, wind around it with their numerous little branches, fuse into one, and press it into the interior of the body, where all the nutritive portions are rapidly absorbed and immediately assimilated, while all that is useless is quickly ejected. The variations among the different moners, of which so far 16 kinds have been described (Haeckel's *Monographie der Moneren*), consist partly in the various forms of the pseudopodia, but especially in the different kinds of propagation. Some of them merely divide on reaching a certain size into halves; others put forth little buds which gradually separate from them; and others experience a sudden division of the mass into numerous small spherical bodies, each of which instantly begins a separate existence and gradually reaches the size of the ancestral organism.—The chemical examination of the homogeneous protoplasmic body shows that it consists throughout of an albuminous or slime-like mass, hence of that azotic carbonate of the character of the highly compounded connective group called proteine, albuminoids, or plasmon bodies. Like other chemical compounds of this group, protoplasm exhibits several reactions which distinguish it from all others. It is easy to detect it under the microscope, on account of the facility with which it combines with certain coloring matters, as carmine and aniline; it is colored dark yellow or yellowish brown by iodine and nitric acid; and it is coagulated by alcohol and mineral acids, as well as by heat. The quantitative composition of protoplasm, though in some cases greatly varying, resembles as a whole that of other albuminoids, and hence consists of from 50 to 55 per cent. of carbon, probably 6 to 8 of hydrogen, 15 to 17 of nitrogen, 20 to 22 of oxygen, and 1 to 2 of sulphur. Protoplasm possesses the quality of absorbing water in various quan-

ties, which renders it sometimes extremely soft and nearly liquid, and sometimes hard and firm like leather; but it is usually of a medium degree of density. Its more prominent physical qualities are excitability and contractility, which Kühne and others have made a special subject of investigation. On examining the numerous substances constituting the various organs of the higher animals with the microscope, it appears that they all consist of a large number of minute elements, known since Schleiden and Schwann (1838) by the name of cells; and in these cells protoplasm is the oldest, most primordial, and most important constituent. In every real cell there is, besides protoplasm, and while still alive and independent, a second important constituent, the cellular germ, so called (nucleus or cytoblast); but even this germ consists of an albuminous chemical compound which is closely related to protoplasm, and was originally produced from it by an exceedingly slight chemical alteration. The germ is usually a smaller and firmer formation within the protoplasm of the cell.—Inasmuch as the idea of an organic cell, as now adopted by histologists, rests on the presence of two different essential parts in this elementary organism, the internal cell and the external protoplasm, we must distinguish also two different kinds of elementary organisms: germless cytods, as moners for example, and the real germ-enclosing cells, which originate from the former by secreting in the interior of the small mass of protoplasm a true germ or nucleus. Cells of the simplest kind consist only of protoplasm with a nucleus, while in general the cells of animal or vegetable bodies have also other constituents, particularly and frequently an enclosing skin or capsule (the cellular membrane), also crystals, grains of fat, pigments, and the like, within the protoplasm. But all of these parts came into being only secondarily through the chemical action of protoplasm; they are but the internal and external products of protoplasm. (Haeckel's *Generelle Morphologie*, vol. i., p. 279.) The single cell of the simplest kind is able to exist as an independent organism. Many of the lowest plants and animals, and also many neutral *protista* (which are neither animals nor plants), retain for life the character of a simple cell. Such unicellular organisms of the simplest kinds are the *amebæ*, found in large numbers as well in fresh as in salt water. *Amœbæ* are simple naked cells of various and varying forms. The whole difference between them, especially *protamœbæ*, and certain moners, is that they have a germ. It is probable that this germ of the *amebæ* (as may be supposed to be the case with many and perhaps all other cells) is only an organ of propagation, and hence of heredity; while all the other functions, alimentation, motion, and sensation, are performed by the protoplasm. This seems to indicate that at the reproduction of the cells, which is usually effect-

ed by segmentation, it is the germ which first divides in two, and that the protoplasm afterward gathers around each of the two sister germs till it also falls in two. It is impossible to distinguish from the common *amœbæ* the cellular ovules of many of the inferior animals, as for example the sponges, medusæ, and other plant-like animals. With these the eggs are simple naked cells, which, with the sponges especially, sometimes crawl about independently in the body of the animal, giving rise to the idea that they were a class of parasitic *amœbæ*. But with other animals also, and with most plants, the eggs of which generally obtain subsequently special and often very complicated encasements and other additions, every egg is originally a simple cell. The seminal elements of the male are also only simple cells, and the entire mysterious process of fructification is after all nothing but the fusion or concrescence of two different cells, the one a female egg cell, and the other a male semen cell. In consequence of this fusion the germs of the two combined cells dissolve, and therewith the young, newly generated individual begins his existence as a simple cytod, or a small germless ball of protoplasm. But inside of this cytod soon arises a new germ, which turns it again into a cell, and this simple cell forms by oft repeated segmentation an accumulation of cells. Out of this heap are produced by secretion certain germinal layers or "germ leaves," and out of these proceed all the other organs of the complete being. Each of these organs again originally consists only of cells, and in all of these cells the essential constituent parts are only the germ and protoplasm: the germ as the elementary organ of propagation and heredity, protoplasm as the elementary organ of all the other functions, sensation, motion, alimentation, and adaptation. Cells and cytods, therefore, are true elementary organisms, independent minute forms of life, which either in the lowest existences continue to live independently, or in the higher organisms combine in numbers to form a community. Cells and cytods are the veritable "formers" of life, or plastids. The most ancient and primordial forms of plastids are cytods, the whole body of which consists of protoplasm, in which the germs are internally produced, and from which therefore the cells proceed.—As a matter of course, to the infinite varieties presented by the organic forms and vital phenomena in the vegetable and animal kingdom, corresponds an equally infinite variety of chemical composition in the protoplasm. The most minute homogeneous constituents of this "life substance," the protoplasm molecules, or plastidules, as they are called by Elsberg, must in their chemical composition present an infinite number of extremely delicate gradations and variations. The atoms of carbon, hydrogen, nitrogen, oxygen, and sulphur, which compose each of the plastidules, must enter into an infinite number

of diverse stratifications and combinations. The chemistry of to-day, with its imperfect methods of investigation, is totally powerless before these intricate organic compounds, and it is possible only to surmise, from the infinitely varied physiological qualities of the numberless kinds of plastids, the infinite variety of plastidules out of which they are composed. —According to the plastid theory recently advanced, the great variety of vital phenomena is the consequence of the infinitely delicate chemical difference in the composition of protoplasm, and it considers protoplasm to be the sole active life substance. This theory puts force and matter in living organisms into the same causal connection which has long been accepted for force and matter in inorganic bodies. This conception has been rapidly matured, especially in the past 20 years, through the more exact information obtained in regard to the lowest kinds of organisms. Yet the idea had been grasped more than half a century ago; for the "primordial slime" which Lorenz Oken proclaimed in 1809 to be the original source of life, and the material basis of all living bodies, possessed in all essentials the same qualities and the same importance now ascribed to protoplasm; and the *sarcode* so called, which in 1835 was pointed out by the French zoölogist Félix Dujardin as the only living substance in the body of rhizopods and other inferior primitive animals, is identical with protoplasm. But when Schleiden and Schwann, in 1838, developed their cell theory, they were not acquainted with the fundamental significance of protoplasm. Even Hugo Mohl, who in 1846 was the first to apply the name protoplasm to the peculiar serous and mobile substance in the interior of vegetable cells, and who perceived its high importance, was very far from understanding its significance in relation to all organisms. Not until Ferdinand Cohn (1850), and more fully Franz Unger (1855), had established the identity of the animate and contractile protoplasm in vegetable cells and the sarcode of the lower animals, could Max Schultze in 1858-'61 elaborate this protoplasm theory of the sarcode, so as to proclaim protoplasm to be the most essential and important constituent of all organic cells, and to show that the bag or husk of the cell, the cellular membrane, and the intercellular substances, are but secondary parts of the cell, and are frequently wanting. In a similar manner Lionel Beale (1862) distinguished such primary forming and secondary formed substances in all organic tissues, and gave to protoplasm, including the cellular germ, the name of "germinal matter," and to all the other substances entering into the composition of tissues, being secondary and produced, the name of "formed matter." The protoplasm theory received a wide and thorough illustration from the study of rhizopods which Ernst Haeckel published in 1862 in his *Monographie der Radiolarien*, and its complete

application in the *Generelle Morphologie der Organismen* by the same naturalist. Haeckel distinguishes in these works, for the first time, between germless protoplasm, consisting only of plastids called cytods by him, and the germ-containing real cells, the elementary organism of which consists already of two different essential parts, germ and protoplasm. He conceived the cytods and cells as two different gradations of plastids, of organic elementary individuals, or as "individuals of the first order," and adopted entirely, in regard to the individual independence of the plastids, the ideas which had been set forth by Rudolf Virchow and Ernst Brücke. Virchow, whose *Cellular-Pathologie* contains the most complete application of the cell theory to pathology, called the cells and the "cell territories" belonging to them the individual hearth or source of life; Brücke designated them as "elementary organisms." The plastids or individuals of the first order, identical with them, were determined by Haeckel phylogenetically, to the effect that cytods and cells must be distinguished as two essentially different orders of formation; *i. e.*, that cells were phylogenetically produced in a secondary manner from homogeneous cytods by means of the secretion of a germ by the protoplasm. This distinction is important for the reason that many of the lowest orders of organisms have no germ in the protoplasm; such is the case especially with the moners. These simplest of organisms were first discovered by Haeckel in 1864, and described by him in 1868 in his *Monographie der Moneren*. Cienkowski and Huxley also made valuable investigations of various moners. The latter discovered in 1868 the famous bathybius, a very remarkable kind of moner, which at immense depths covers the bottom of the sea in immeasurable numbers, and which consists of formless and variable protoplasm tissues of different sizes. Among the moners investigated by Cienkowski, the most interesting are the vampire cells, which are formless little bodies of protoplasm that bore into vegetable cells by means of their pointed pseudopodia, kill them, and absorb the protoplasm they find in them. On the basis of these discoveries Haeckel elaborated his plastid theory and carbon theory, which give the extremest philosophical consequences of the protoplasm theory.—In England the monistic philosophy of protoplasm has received the most weighty support from Huxley, whose "Protoplasm, or the Physical Basis of Life" (1868), put it in its true light, and called forth numerous writings for and against it. One of the most recent treatises in favor of it is that of James Ross "On Protoplasm" (1874). Probably the name of plasson will be given to the primordial, perfectly structureless, and homogeneous protoplasm of the moners and other cytods, in contradistinction to the protoplasm of germ-containing cells, which are produced only subsequently, by the differentiation of an

internal nucleus and external protoplasm by the plasson bodies of moners. Édouard van Beneden especially calls for this distinction in his *Recherches sur l'évolution des grégaires*; and Haeckel has adduced new facts in favor of it in his *Monographie der Kalkschwämme*. For the theory of "primordial generation," the spontaneous generation of the first vitality on earth, the distinction is of special importance, as the first organisms thus produced could have been only structureless specks of plasson, like the bathybius and other moners. The great theoretical difficulties formerly in the way of the theory of primordial or spontaneous generation have been removed by the discovery of the moners and the establishment of the plastid theory. As the protoplasm of the bathybius is not yet as much as individualized, while in the case of other moners there are individual lumps of constant sizes, it follows that the moners are to be regarded as the natural bodies which effect the transition from inorganic to organic nature.—The following list of publications gives the literature of the important discoveries in this field in chronological order: Hugo Mohl, *Ueber die Saftbewegung im Innern der Zelle* (in *Botanische Zeitung*, 1846); Ferdinand Cohn, *Nachträge zur Naturgeschichte des Protococcus pluvialis* (in *Nova Acta Naturæ Curiosorum*, 1850); Hugo Mohl, *Grundzüge der Anatomie und Physiologie der vegetabilischen Zelle* (1851); Franz Unger, *Anatomie und Physiologie der Pflanzen* (1855); Max Schultze, *Innere Bewegungerscheinungen bei Diatomeen* (in Troschel's *Archiv für Naturgeschichte*, 1860), *Die Gattung Cornuspira unter den Monothalamien*, &c. (1860), and *Ueber Muskelkörperchen und das was man eine Zelle zu nennen habe* (1861); Ernst Brücke, *Elementar-Organism* (in *Sitzungsberichte der Wiener Akademie*, 1861); Ernst Haeckel, *Die Sarcode der Radiolarien: Monographie der Radiolarien* (1862); Lionel Beale, "The Structure of the Simple Tissues of the Human System" (1862); Max Schultze, *Das Protoplasma der Rhizopoden und der Pflanzenzellen* (1863); Haeckel, *Ueber den Sarcodkörper der Rhizopoden* (*Zeitschrift für wissenschaftliche Zoologie*, 1864); Wilhelm Kühne, *Untersuchungen über das Protoplasma und die Contractilität* (1864); Haeckel, *Generelle Morphologie der Organismen* (1866), and *Monographie der Moneren* (in *Jenaische Zeitschrift für Naturwissenschaft*, 1867); Huxley, "Protoplasm, or the Physical Basis of Life" (1868), and "On some Organisms living at Great Depths in the North Atlantic Ocean" (in "Journal of Microscopical Science," 1868); Haeckel, *Beiträge zur Plastiden Theorie* (in *Jenaische Zeitschrift*, 1870); Rudolf Virchow, *Die Cellularpathologie in ihrer Begründung auf physiologische und pathologische Gewebelehre* (4th ed., 1871); Édouard van Beneden, *Recherches sur l'évolution des grégaires* (in *Bulletin de l'Académie royale de Belgique*, 1871); Haeckel, *Monographie der Kalkschwämme* (1872); James Ross, "On Pro-

toplasm" (London, 1874); John Drysdale, M. D., "The Protoplasmic Theory of Life" (1875); and H. Charlton Bastian, "Evolution and the Origin of Life" (1875). "As regards Protoplasm," by J. H. Stirling (Edinburgh, 1869), is intended as a refutation of the theory.

PROTOZOA (Gr. *πρῶτος*, first, and *ζῶον*, animal), a subdivision of invertebrate animals, proposed by Siebold, since adopted by Leuckart and Vogt, and now generally admitted by naturalists. As they include the lowest and in most cases the most microscopic of animals, the limits of this division are not well defined; they comprise many of the so-called animalcules, as well as the large sponges. They are composed of a nearly structureless, jelly-like substance, called protoplasm or sarcode, without distinct segments, internal cavity, or nervous system, and with no or a very rudimentary digestive apparatus. (See PROTOPLASM.) Dr. Engelmann has observed in *arcella*, a minute amœba-like protozoan, a periodical development of gas in the granular protoplasm, unconnected with the contractile vacuoles or the nuclei. He thinks this is a voluntary act, and that the bubbles are used in the manner of a float or air bladder. Its chemical composition and the mechanism of its production and absorption were not determined. The usually accepted division is into the classes of *gregarinida*, *rhizopoda* (like amœbæ, foraminifers, and sponges), and *infusoria*, the highest, with a mouth and digestive apparatus, like the bell animalcules and *paramœcium*. As these represent the first step in animal organization, so do the protophytes the first in vegetable life; the former were called *oözoa* by Carus, from their resemblance to the ova or germs of higher animals; the latter, as far as known, were microscopic seaweeds, without the radiate structure characteristic of plants, and are found in the lower Silurian strata. (See ANIMALCULES, BATHYBIUS, COCCOLITHS, FORAMINIFERA, GLOBIGERINA, and GREGARINA.)—See Prof. Packard on the "Development of Protozoa," in the "American Naturalist," December, 1874, to February, 1875.

PROTRACTOR, an instrument for laying off angles in plotting. There are four principal forms of the protractor: the rectangular, the semicircular, the circular, and the reflecting. The rectangular consists usually of a thin rectangular piece of ivory or metal, three edges of which are graduated from 0 to 180 degrees by portions of radii converging to the middle of the fourth edge as a centre; it is used only where a loose approximation to accuracy suffices. The circular and semicircular protractors, with either two, one, or no arms, are graduated circular arcs (usually metal), with or without flat straight-edged arms, turning about their perforated centres, and carrying verniers for the accurate reading of their arcs. But as they are only capable of protracting and measuring single angles on a map, they have not so wide a range of usefulness in engineering and sur-

veying as the three-arm protractor. The three-arm circular protractor is a modification of the station-pointer, differing from it in having its verniers movable and its arcs fixed, instead of the opposite. It consists of a graduated circular arc fixed to the middle one of three long flat arms which turn about its centre, from which diverge their straight fiducial edges. Fixed to each of the side arms is an index and vernier, by means of which those arms can be set so as to make any required angles with the middle arm. This instrument furnishes the readiest and most accurate graphic solution of the three-point problem on which hydrographers so universally depend for determining positions of the sounding boat. The reflecting protractor, invented in January, 1874, by T. J. Lowry of the United States coast survey, enables one observer to measure at the same instant two adjacent angles, and plot them with the same instrument. It is obtained by placing between the fixed and each of the movable arms of the three-arm protractor an index arm; and each of these is so connected with those by means of jointed parallelograms that it always bisects the angle contained by the fixed arm and its corresponding movable protractor arm. Each of these index arms carries a mirror mounted perpendicular to its plane (and over its centre) of motion; these mirrors may be mounted to move either in the same or in parallel planes. (See *SEXTANT*.) Slightly forward of these mirrors on the line of sight is fixed a horizon glass, half silvered to admit of direct and reflected vision. As the angular distance moved over by a mirror while measuring an angle is only half of the actual angle measured, and as each of these movable protractor arms is driven along its arc simultaneously with and twice as fast as its corresponding index arm, the angles contained by the fixed and movable protractor arms are the actual angles measured. When using the reflecting protractor the observer brings its face into the plane passing through his eye and three objects, and then sets his index arm so that the reflected and direct images of the objects (say left-hand and middle) of one of the desired angles are not coincident, yet approaching on account of the progress of the boat, and with the second index glass he makes the images of the right-hand and middle objects coincident, and keeps them so with the tangent screw till the first two objects become coincident, then clamps, and the angles are measured and also ready set off on the instrument. He now places the instrument on the map and shifts it until the fiducial edges of its protractor arms traverse the three points observed on, and dots the centre of the position.

PROUDHON, Jean Baptiste Victor, a French jurist, born at Chansans, Franche-Comté, Feb. 1, 1758, died in Dijon, Nov. 20, 1838. During the revolution he was judge at Pontarlier and assistant deputy to the legislative assembly, and afterward a member of the civil tribunal at

Besançon. In 1802 he delivered free lectures on law; in 1806 he was appointed professor of civil law in the school of Dijon, and in 1809 became dean of the faculty. His principal works are: *Traité sur l'état des personnes et sur le titre préliminaire du Code civil* (1810); *Traité des droits d'usufruit, &c.* (9 vols., 1823-'6); and *Traité du domaine public* (5 vols., 1834-'5).

PROUDHON, Pierre Joseph, a French political writer, born in Besançon, July 15, 1809, died at Passy, Paris, Jan. 19, 1865. He was educated at the college of his native city, became apprentice to a printer, and in 1837 was taken into partnership by a printing firm at Besançon. He published an edition of the Bible with annotations upon the principles of the Hebrew language, and reprinted Bergier's *Éléments primitifs des langues* (1837), with an anonymous *Essai de grammaire générale*, by himself, as an appendix. This essay received from the academy of Besançon a prize consisting of a triennial pension of 1,500 francs, which enabled him to visit Paris. Here he became a contributor to Parent Desbarres's *Encyclopédie catholique*, and wrote for the Besançon academy a prize essay, *De la célébration du dimanche* (1840), and a paper entitled *Qu'est-ce que la propriété?* This pamphlet, which opened with the afterward celebrated dictum, *La propriété c'est le vol*, was censured by the academy, who at once cut short Proudhon's allowance; but the economist Blanqui, who had been appointed to examine it, declared that he found nothing objectionable in it. It was followed in 1841 by another pamphlet on the same question, and in 1842 by an *Avertissement aux propriétaires*, for which he was arraigned before a jury at Besançon, but was acquitted. In the same year he went to Lyons, and from 1843 to 1847 was director of a company running freight boats on the Saône and Rhône. In the mean time he continued to propagate his opinions in *De la création de l'ordre dans l'humanité* (1843), presenting the theory of a new political organization, and *Système des contradictions économiques* (2 vols. 8vo, 1846). On the breaking out of the revolution of February, 1848, he was in Paris engaged in the publication of his *Solution du problème social*, a plan of social reform by means of a new organization of credit and monetary circulation. On April 1 he became the editor of *Le représentant du peuple*, a daily journal of radical opinions, suspended in August. On June 4 he was elected deputy to the constituent assembly, and on July 31 he came forward to urge a proposition which he had previously made for the establishment of a progressive income tax, the design of which was the abolition of interest on capital, and eventually the consolidation of the republican government. This was almost unanimously voted down "as an odious attack upon the principles of public morality and an appeal to the worst passions." He closed his parliamentary career

by opposing (Nov. 4) the adoption of the constitution, which he looked upon as "dangerous to liberty." He next edited in succession three short-lived journals, the last of which expired Oct. 13, 1850. These papers were repeatedly condemned by the courts, but the fines imposed upon the editor were immediately paid by his admirers. His printed speeches and pamphlets, including his *Droit au travail* (1848), *Les Malthusiens, Démonstration du socialisme*, and *Idées révolutionnaires* (1849), found a ready sale among men of all opinions, and elicited answers from the ablest pens in the conservative party. In January, 1849, he had undertaken to establish *la banque du peuple*, an institution of gratuitous credit, by means of which he hoped to bring his theory into operation; but in this he was interrupted, March 28, by a sentence of three years' imprisonment for illegal publications, which he at first avoided by flight. After sojourning in Geneva for a few months, he delivered himself up (June 4), and was incarcerated successively in the Conciergerie, at Doullens, and in the prison of Ste. Pélagie, where in 1850 he married a merchant's daughter. During his imprisonment he wrote *Confessions d'un révolutionnaire* (1849), *Actes de la révolution* (1849), *Gratuité du crédit* (1850), and *La révolution sociale démontrée par le coup d'état* (1852), which created a deep sensation and was looked upon as a partial apology for Napoleon's policy. He was liberated on June 4, 1852; in 1856 published a *Manuel des opérations de la bourse*, a satire on stockjobbers and speculators; and soon afterward *De la justice dans la révolution et dans l'église, nouveaux principes de philosophie pratique* (3 vols., 1858), which he ironically dedicated to the archbishop of Besançon. This metaphysical work, a covert attack upon the established order of things, was seized by the police, and its author was sentenced to three years' imprisonment and a fine of 4,000 francs; but Proudhon was in Belgium, where he remained till November, 1860, when the amnesty granted to the press by Napoleon III. permitted him to return to Paris. His principal later works are: *La guerre et la paix* (2 vols., 1861); *Théorie de l'impôt* (1861); *La fédération et l'unité en Italie* (1862); and *Du principe fédératif et de la nécessité de reconstituer le parti de la révolution* (1863). Among his posthumous works are: *Les Évangiles annotés* (1865), which was seized and the editor was sentenced to a year's imprisonment; and *France et Rhin* (1867).—See *Proudhon, sa vie, ses œuvres et sa correspondance*, by Charles Clément (1872). The first volume of his correspondence was published in 1874, and is to be followed by seven others, besides several additional posthumous works.

PROUT, Father. See MAHONY, FRANCIS.

PROUT, Samuel, an English water-color painter, born in Plymouth, Sept. 17, 1783, died in London, Feb. 10, 1852. Some sketches of Cornish scenery which he executed for Britton the

antiquary first brought him into notice, and in 1805 he removed to London. He published a series of studies executed in lithography (1816); "Facsimiles of Sketches made in Flanders and Germany;" "Sketches in France, Switzerland, and Italy;" "Antiquities of Chester;" "Hints on Light and Shade, Composition, &c., as applicable to Landscape Painting;" "Microcosm, the Artist's Sketch Book of Groups of Figures, Shipping, and other Picturesque Objects;" and "Hints for Beginners."

PROUT, William, a Scottish physician, born in 1786, died in London, April 9, 1850. He received his professional education at the university of Edinburgh, but passed the greater part of his life in London. His researches on the application of chemistry to the explanation of the phenomena of life are contained in an important work "On the Nature and Treatment of Stomach and Renal Diseases" (5th ed., 1848). He also published "An Inquiry into the Nature and Treatment of Gravel" (1821); "Chemistry, Meteorology, and the Function of Digestion, considered with reference to Natural Theology," a Bridgewater treatise (1834; 4th ed., 1855); and a number of papers in scientific magazines and transactions.

PROVENÇAL LANGUAGE AND LITERATURE.

Provençal belongs to the Romance or Romanic group of the Aryan or Indo-European family of speech. (See ROMANCE LANGUAGES.) Its real home is the south of France, the boundary line running through Dauphiny, Lyonnais, Auvergne, Limousin, Périgord, and Saintonge. It is spoken also in the east of Spain, Catalonia, Valencia, and the Balears, and in Savoy and a portion of Switzerland. At present several dialects may be distinguished: New Provençal, Languedocian, Limousinian, Auvergnian, Dauphinese, Waldensian, Gascon, and Catalan. The Provençal language separated from the idiom of northern France, designated as *la langue d'oïl*, from the use of the affirmation *oïl* (Lat. *illud*), about the beginning of the 9th century. Probably there was once but one Romance language in the whole of Gaul, though some of the early literary monuments which are generally produced as examples of the original uniform tongue, also dating from the 9th century, have a preponderance of French forms. In order to distinguish the newly formed dialect of the south of France from Italian, Spanish, and French, and to give it a geographically comprehensive name, it was natural to select for it the name of the largest province within its territory. Thus, in distinction from *romana*, came into use *la lingua proensal*, *la proenzal*, *le proensalès*, and *vulgar proensal*; and the people who spoke it were called *Provinciales*, though also *Francigenæ*. It received also the name of Limousinian (*lemosin*), after the province of Limousin, which was gradually transferred also to the Catalan-Valencian idiom. As a large part of southern France came to be called Languedoc or Llenquadoch, after the use of the affirmation *oc*

(Lat. *hoc*), which is the origin also of the middle Latin name Occitania and of the French adjective *occitanien*, later writers fell into the habit of applying the name of *langue d'oc* to the whole Provençal language, while it should be strictly confined to the Occitanian dialect. The middle of the 10th century furnishes the first monument of the Provençal language, but its principal development occurred in the 12th and 13th centuries, the flourishing period of the peculiar poetry of the troubadours. But as early as the middle of the 13th century the language ceased to be used by the higher classes. As the troubadours took particular pains to ridicule the clergy and the practices of the church, they drew upon themselves the ill will of the ecclesiastical party, and in 1245 Innocent IV. issued a bull in which he called Provençal the language of heretics, and forbade its use by students. The wars which during the early part of the 13th century desolated the south of France were also fatal to the language. The troubadours sought refuge at the court of Aragon and in Catalonia, and kept the language for a time from corruption; but by the beginning of the 14th century Provençal generally succumbed in Spain also to the adjacent dialects. An attempt was made to preserve the language by establishing consistories of the "gay science" in Toulouse and Barcelona, but their success was short. In Italy, in the northwest of which it was spoken, it was quickly forgotten on the revival of the ancient literature, and was superseded by Tuscan. The language thus passed into dialects spoken only by the peasantry in its former territory, and its use for poetical composition has come to be only a matter of caprice.—Provençal is the earliest Romance language which received grammatical treatment; but the object was only to check the carelessness of expression on the part of the poets, and thus to counteract the threatening decadence of the language. Provençal scarcely ever developed into a uniform literary language, as the poets lived at the various courts. But the efforts on the part of the troubadours to attain a certain elegance, ease, and variety of diction, causing them to reject many expressions as inelegant and impure, led to the formation of a choicer language than that used by the masses, which was called *lo dreg proensal*, or *la dreita parladura*; this was not peculiar to any one province, though not without provincialisms. The want of an orthography, and the indefiniteness of the dialectical variations, render it very difficult to determine either the pronunciation or the construction of the language. The grammatical treatises of Uk Faidit and Raimon Vidal hardly touch upon these subjects. They contain discourses on long and short syllables, and there is an attempt to show the difference of pronunciation between French and Provençal. Only the *Lays d'amors* makes frequent reference to the value of the letters and to orthography. The

forms *fau* and *fatz*, *plai* and *platz*, *faire* and *far*, *conques* and *conquis*, *ditz* and *di*, and the like, are used for the same words by one poet, and the rhymes follow accordingly; yet such instances cannot be cited to prove that *quar* (Lat. *quare*) was pronounced differently from *car*, or *altre* otherwise than *autre*; for *quar* and *altre* may have been written according to etymology, while *car* and *autre* represented the pronunciation. Accordingly but little is said in modern philological works on Provençal about the pronunciation of it. When Raynouard, the great student of the *langue d'oc*, was interrogated in regard to it, he replied: *Il n'y a pas de prononciation provençale* ("There is no Provençal pronunciation"); and Diez, who has given the fullest treatise on Provençal vowels and consonants, admits that there is a great amount of truth in the reply.—The characteristics of the modern Provençal dialects are the following. In the New Provençal many words ending in *e* in French have *i*, as *agi*, *couragi*; *au* is generally sounded *ou*; *l* is changed into *u* and *ll* (as in *filles*) into *y*; and *c* before *a* is sometimes guttural and sometimes palatal. The Occitanian dialects of Languedoc resemble New Provençal very closely. In Toulouse *oi* is sounded instead of *ei*; in Montpellier, *io* for *ue*; the letter *l* is not always changed into *u*; final *n*, preserved in Montpellier, is dropped in Toulouse; Latin *et* and *di* change into *ch*, and *v* into *b*. The Limousinian dialect may be divided into Upper and Lower Limousinian. In the latter *a* is generally sounded as *o*, *ai* as *ei*, *ieu* as *iou*, *ch* as *ts*, *j* and soft *g* as *dz*. In Auvergne *ai* becomes *oue*; *oi*, *eu*; *eu* and *iu*, *iau*; final *l* and *n* disappear; *s*, *g*, and *z* often become palatals; *ch* is sounded as in French, and final *c* as *t*; *l* often becomes *r*. In Dauphiny, especially at Grenoble, the influence of the French pronunciation becomes more apparent, while the Waldensian dialect has experienced some changes through the influence of Italian. In fact, we may doubt whether the latter has been directly derived from Provençal, though the early Waldensian literary monuments betoken a near kinship to it. Gascon still shows its Provençal origin, but it has absorbed so many foreign elements that its parentage is greatly obscured. Prominent among its peculiarities are the preceding of *r* by *a*, opening *ll* for *l*, internal *r* for *l*, *ch* for *s* and *ss*, *qua* sounded with an audible *u*, *b* for *v*, and *h* for *f*. Catalan is properly not a dialectical variation of Provençal, but rather an independent idiom closely related to it. Its peculiarities are the change of mute *e* into *a*; the preservation of *e* and *o* without change into diphthongs; the absence of *ie*, *ue*, *iei*, *ieu*, and the rare use of other diphthongs and triphthongs; the softening of *l* into *ll*; the dropping of Latin final *n*; the palatal sounds of *g*, *j*, and *x*; *ch* in the beginning of words for *c*; the sound of *z* for *c*; and the audible *u* in *qua* and *gua*. Valencian is almost the same as Catalan,

only somewhat softer in pronunciation.—The first monument of the Provençal language belongs to the middle of the 10th century. It is a fragment of 257 ten-syllable verses on Boëthius, and has been preserved in a manuscript of the 11th century, which, according to Paul Meyer, and as appears from the language and mode of writing, originated in Limousin or Auvergne. Next in historical order come a few partly Provençal poems, including a long poem on the passion of Christ, and the legend of St. Leodegar, published in Champollion-Figeac's *Documents historiques*. Raynouard has collected several Latin documents with sentences of Provençal interspersed, dating from about 860 to 1080; and other documents in part or entirely Provençal, of a later date, have been embodied in Bartsch's *Chrestomathie*. Several minor poems on religious subjects and several sermons, dating from about the 11th century, have been collected by Paul Meyer. Of the same date, or perhaps of the beginning of the 12th century, is a manuscript recently published by Konrad Hoffmann, containing a paraphrase of the discourse of Christ in John xiii. The main feature of the flourishing period of Provençal literature is the poetry of the troubadours. According to Quiraut Riquier, it would seem that the troubadours were in a measure the successors and disciples of the *jongleurs*, who made a sort of trade of rhyming and singing and dancing. Some account of the *art de trobar* (art of inventing) is necessary for an adequate idea of the main characteristic of Provençal poetry. In one class of versification, the *canson* (*canzo*, *canzoneta*), the rhymes, pauses, and general manner of the first stanza had to be maintained through all the succeeding stanzas, and at the close came a *commiato*, or summary of the whole, addressed by the poet to his friends, patrons, or mistress. The *servente* permitted greater ease of composition, and while the *canson* was used chiefly for moral and amorous effusions, the office of the latter poetic form was to serve as a vehicle for attacks on the secular and spiritual lords, as well as for love songs of a satirical or light nature. In the *tensons*, or poetic combats, two or more persons support opposite sides on some subject of philosophy or love. Though these combats were originally extemporary, in later times several troubadours would choose a common subject and metre; the first would compose a stanza and transmit it to another, who would compose the second stanza, and so on; and when each of the disputants had added his part, the whole would be submitted to competent judges, forming what was called a "court of love." There are also epistolary treatises on the subjects of love, friendship, and chivalry, which were called *donaire*, *sautz*, and *ensenhamen*. The *planh* is a kind of elegy celebrating the memory of a fallen knight, or mourning over disappointments in love. Little poems sung during the dance were

called *balada* and *dansa*; they were mostly of a very simple nature. The *serena*, serenade or evening song, gives utterance to the most passionate love, but only one has come down to us. The *alba*, or waking song, reminds the lovers that it is dawn. The *pastoreta* or *pastorela* generally gives a conversation held between a knight and a shepherdess, one complimenting the other, and always on the subject of love.—The earliest troubadour of whom any poetic remains have been preserved is William IX. of Poitiers (1071–1127). Among the most important Provençal poets subsequent to him must be mentioned first of all Giraud de Bornel (1170–1220), who in the opinion of his contemporaries was the greatest of all. Richard Cœur de Lion of England, Alfonso II. of Aragon, and Robert I. of Auvergne were also celebrated troubadours. They were excelled, however, by Bertrand de Born, their contemporary, whom Dante and Uhland would have immortalized if his own fiery and warlike rhymes had not. Other famous troubadours toward the end of the 12th century were Marcabrun, Jaufre, Randal, Count Rambaut III. of Orange, Peire of Auvergne, Peire Rogier, Peire Raimon of Toulouse, Arnaut de Marueil, Peire Vidal, Rambaut de Vaqueiras, Peirol, the monk of Montauban, and Arnaut Daniel. To the 13th century belong the names of Faidit, Raimon of Miraval, Savarik of Mauléon, Uk of Saint Cyr, Aimerik of Peguilain, Peire Cardinal, Guillem Figueiras, Sordel, Bonifaci Calvo, Bertolome Zorzi, and Quiraut Riquier. Among the treatises on the troubadour's art stands foremost *La dreita maniera de trobar*, "The Correct Art of Versifying," by Raimon Vidal, who seems to have been a famous troubadour of the middle of the 13th century. Another, but more of a grammatical nature, is the *Donatus Provincialis* by Uk Faidit, extant in two editions, one Romance, the other Latin; both have been published in Guessard's *Grammaires romanes inédites*. A full grammar and science of poetry was published by the consistory *del gay saber* of Toulouse, and edited by Moulinier, entitled *Leys d'amors*, "Laws of Love," i. e., of the poetry of love. A portion of it, *Las flors del gay saber*, appeared in 1356. But by this time Provençal verse was almost extinct. The troubadours had lost their most eminent patrons, and the attempt to revive them by distributing prizes for the best composition in the floral games of Toulouse failed to establish the name of any Provençal poet. Still, there have always been some who used Provençal for their poetic compositions, and in the 19th century several have even gained celebrity as Provençal poets. Foremost among these stands Jacques Jasmin, the barber of Agen (1798–1864), and after him come José Roumanille, Théodore Aubanel, and the marquis de la Fare-Alais. The most eminent living Provençal poet undoubtedly is Frédéric Mistral, the pupil of Roumanille, and one of the largest contributors to *Li Prouvençalo*

(1852), a collection of modern Provençal poetry. His fame rests principally on his charming rustic epic entitled *Mirèio* (1859), translated by himself into modern French (*Mireille*), and set to music by Gounod, and of which there are versions in English by H. Crichton and by Harriet W. Preston.—The earliest writers on the Provençal literature were Cardinal Bembo and Jean de Nostre Dame, or Nostradamus, brother of the astrologer. Nostre Dame collected a large number of manuscripts, and composed a work on the lives and writings of the old Provençal poets. Lacurne de Sainte-Palaye expended a vast amount of time and labor in ransacking the libraries of France and Italy, and collecting materials on the subject, which the abbé Millot published under the title of *Histoire littéraire des troubadours* (3 vols., Paris, 1774; abridged English translation by Mary Dobson, London, 1779). But it is chiefly to M. Raynouard, a native of Provence, that we are indebted for our knowledge of the Provençal. In his *Choix des poésies originales des troubadours* (6 vols., Paris, 1816-'21), he published vestiges of their early poetry, and lives and extracts from the writings of about 350 poets. Previously he had written a grammar of the language (1816), and to this he added a lexicon which appeared after his death (6 vols., 1838-'44). In his footsteps followed Charles Claude Fauriel, whose *Histoire de la poésie provençale* (3 vols. 8vo, Paris, 1846; abridged English translation, New York, 1860), delivered in a series of lectures as professor in the faculty of letters at Paris, is the most elaborate work on the subject upon which it treats. In Germany the study of Provençal received a scientific foundation at the hands of Friedrich Diez, whose *Die Poesie der Troubadours* (Zwickau, 1826) and *Leben und Wirken der Troubadours* (1829) have been translated into French and English. See also Mahn, *Die Werke der Troubadours in provenzalischer Sprache* (Berlin, 1846 et seq.), *Die Biographien der Troubadours* (1853), and *Gedichte der Troubadours* (4 vols., 1856-'68); Paul Meyer, *Anciennes poésies religieuses en langue d'oc* (Paris, 1860), *Cours d'histoire de la littérature provençale* (1865), and *Recueil d'anciens textes bas-latins, provençaux et français* (1873 et seq.); Böhmer, *Die provenzalische Poesie der Gegenwart* (Berlin, 1870); Karl Bartsch, *Grundriss zur Geschichte der provenzalischen Literatur* (1872), and *Chrestomathie provençale* (Paris, 1875); and Rutherford, "The Troubadours: their Loves and their Lyrics" (London, 1873).

PROVENCE, an ancient province of S. E. France, bounded N. by Dauphiny and Venaisin, E. by the Alps, S. by the Mediterranean, and W. by Languedoc. It was a part of the territory to which the Romans gave the name of Provincia, and was divided into Upper and Lower Provence, watered by the Rhône, Durance, and Var, and celebrated for its delightful climate and rich fruits, though the soil

is somewhat arid. Its capital was Aix. It now forms the departments of Basses-Alpes, Bouches-du-Rhône, and Var, and a part of those of Drôme, Vaucluse, and Alpes-Maritimes.—This territory passed into the hands of the Visigoths in the 5th century, and of the Ostrogoths in the 6th, and, after being for a while in the possession of Austrasia, fell to Lothaire on the division of the empire of Charlemagne. In the latter part of the 9th century it formed part of Cisjurane Burgundy, and in the 10th of the kingdom of Arles, which was subsequently united to Germany; but Provence meanwhile was governed by virtually independent counts, who about 1063 became hereditary. In the middle of the 13th century it passed by marriage into the possession of Charles of Anjou, afterward king of Naples. The last count, Charles, grandson of René the Good, bequeathed it in 1481 to Louis XI., and it was united to the crown of France by Charles VIII. in 1486.

PROVERBS, a book of the Old Testament, entitled in the Hebrew original as well as the Septuagint and the Vulgate "The Proverbs of Solomon." Its real or final authorship, however, is not ascribed to Solomon, for it is expressly stated at the opening of chapter xxv. that the latter part, beginning with that chapter, was written and added to the previous portion by order of King Hezekiah. Moreover, it is considered doubtful whether Solomon ever made any collection of his proverbs in writing. But it has hardly ever been contested that a large share in the composition of the book may be ascribed to the wise king, who is said (1 Kings iv. 32) to have uttered 3,000 proverbs, and who was so celebrated all over the eastern world for his wisdom. The ancient writers of the Greek church frequently gave to this book the name *Sophia* (wisdom).—The book is divided into several parts, which are distinguished from each other by separate headings. The first seven verses of the first chapter may be regarded as a heading for the entire book. Then begins the first part, closing with the end of the ninth chapter. This part does not contain a collection of proverbs proper, but rather a series of connected admonitions in a sententious form. They inculcate the love of wisdom, and describe the glorious reward of wisdom and the pernicious consequences of wickedness. The second part, which extends from chap. x. to xxii. 16, contains the main collection of proverbs and the chief portion of the entire book. The proverbs, about 400 in number, contain moral precepts and rules of life for every age and every class of men. Generally one proverb is comprised in one short verse, of two members or clauses, and six, seven, or eight words. The two members form a parallel opposition, or occasional correspondence, to each other, which is generally carried out even to the single expressions; as for example x. 1 (rendering the Hebrew literally):

A-wise son	gladdens	(his) father.
A-foolish son	(is) the-grief	of-his-mother.

The grouping together of the proverbs in this part appears to have been accidental, except that occasionally two or three verses follow each other which have a characteristic expression in common. With xxii. 17 a kind of appendix begins. The proverbs of this section generally consist of two verses, and sometimes of three; they are constructed with less regularity, sometimes containing more than two members, and often without any parallelism. Sometimes proverbs of kindred contents are grouped together. A second appendix to the first collection begins at xxiv. 23, and is separated from the preceding by the heading, "These also are from wise men" (in the common English version, "These things also belong to the wise"). —The second main collection begins with chapter xxv., which is headed, "These are also proverbs of Solomon, which the men of Hezekiah, king of Judah, copied out." The proverbs, as in the first collection, consist generally of one verse each, and each verse of two or more members with parallel relation; yet exceptions to this rule occur more frequently than in the first collection. The proverbs of the second collection are not so plain and intelligible as those of the first, but more artificial and frequently even enigmatical. This collection extends over five chapters, and is again followed in the last two chapters of the book by three different appendices. —It is impossible to decide whether the compilation and arrangement of the entire book were made at one time by one man, or whether the addition of the several parts took place at different periods. The advocates of the former opinion adduce in their favor, that the arrangement of the whole seems to rest on a well conceived and thoroughly executed plan. In either case it is considered probable that the book received its present form between the time of the death of King Hezekiah and the end of the 7th century B. C. —There are commentaries on this book by Salazar (1641), Schultens (1748), Hodgson (1788), Lawson (1821), Umbreit (1826), Ewald (in vol. iv. of his *Die poetischen Bücher des Alten Bundes*); Bertheau, *Exegetisches Handbuch* (1847); Hitzig, *Die Sprüche Salomo's* (1858); Wardlaw (2 vols., 1860-'61); Kamphausen, in Bunsen's *Bibelwerk* (1865); Zöckler, in Lange's *Bibelwerk* (1867; translated for the American edition by Dr. Aiken, 1870); Delitzsch (1873), and others. German translations are added to the commentaries of Umbreit, Ewald, Hitzig, Kamphausen, Zöckler, and Delitzsch. There is an English translation, with *Ecclesiastes and Canticles*, by Noyes (Boston, 1846; 3d ed., 1867); and a revised version, with critical and explanatory notes, by Conant (New York, 1872).

PROVIDENCE, the N. county of Rhode Island, bordered N. and E. by Massachusetts and W. by Connecticut, and drained by the Blackstone river, which runs partly along the E. border, and the Pawtuxet, which forms a portion of

the S. boundary; area, 380 sq. m.; pop. in 1870, 149,190. It has an uneven surface and generally fertile soil. It is intersected by several railroads centring at Providence. The chief productions in 1870 were 9,887 bushels of rye, 85,114 of Indian corn, 15,386 of oats, 9,900 of barley, 329,515 of potatoes, 38,606 tons of hay, 3,330 lbs. of wool, 296,128 of butter, and 30,235 of cheese. There were 3,323 horses, 8,056 milch cows, 1,369 working oxen, 3,655 other cattle, 1,667 sheep, and 6,612 swine. There are numerous manufactories, chiefly at Providence, the county seat.

PROVIDENCE, a city, the principal port of entry, and one of the capitals of Rhode Island, and the shire town of Providence co., at the head of navigation on an arm of Narragansett bay known as Providence river, 35 m. from the ocean, 43 m. S. S. W. of Boston, and 160 m. N. E. of New York; lat. 41° 49' 22" N., lon. 71° 24' 48" W.; pop. in 1708, 1,446; in 1730, 3,916; in 1774, 4,321; in 1790, 6,380; in 1800, 7,614; in 1820, 11,745; in 1830, 16,836; in 1840, 23,172; in 1850, 41,513; in 1860, 50,666; in 1870, 68,904, of whom 17,177 were foreign born; in 1874, 99,608; in 1875, 100,675. Of the population in 1874, 3,557 were colored, 48,074 males, and 51,534 females; 48,351 were of American and 51,257 of foreign parentage, including 36,990 of Irish, 9,532 of English, Scotch, or Welsh, and 2,212 of German descent. There were 16,038 children between 5 and 15 years of age; 20,934 families, with an average of 4.76 persons to each; and 12,188 dwelling houses, with an average of 8.17 to each. The number of families in 1875 was 21,578; of dwellings, 13,383. In population and wealth Providence is the second city in New England. It formerly covered 5.31 sq. m., but in 1867 3.61 sq. m. were annexed from Cranston, forming the 9th ward, and in 1874 5.84 sq. m. from North Providence, forming the 10th ward; the present area is therefore 14.76 sq. m. The city is bounded E. by the Seekonk river, here crossed by two bridges, and lies on both sides of Providence river, which is crossed by a draw bridge and four fixed span bridges. Above this, and within the centre of the city, the river expands into a beautiful cove nearly a mile in circuit, along which is a wall surmounted by an iron railing. A park planted with elms, with gravelled walks, surrounds the cove. Two small streams enter on the north, the Moos-hassuck and the Woonasquatucket rivers, upon which are many machine shops and manufactories. The land on which the city stands is very irregular. On the E. side a hill rises to the height of 204 ft. above tide water. On the west it is level, with little elevation for a quarter of a mile, when the land rises to the height of 75 ft. The hillsides, even to their summit, are covered with dwelling houses, interspersed with gardens and ornamented with trees. The larger portion of the dwelling houses in the city are of wood; the remainder

are of brick and stone, among which are many mansions of great elegance. Several of the churches present fine specimens of architecture. The arcade, on the W. side, is the finest of the kind in the United States. It extends from Westminster to Weybosset street, 225 ft. in length by 80 in width, a portion in the centre being about 50 ft. wider; it is three stories high, has 78 shops, and is devoted chiefly to the retail trade, the principal articles sold being dry goods, boots and shoes, hats, and jewelry. The building is of granite, with two imposing Doric porticoes, one on each street. In the vicinity is the massive granite building of the custom house and post office. The state house is a brick building on the E. side of Providence river. Several of the school houses are handsome buildings. The new opera house and the Butler exchange are also fine structures. Near the railroad depot the state has erected a monument to its citizens who fell in the civil war; it was completed in 1871 at a cost of \$60,000, and consists of a base of blue Westerly granite, with five bronze statues. In the same vicinity a granite building for the city hall has recently been commenced, which will cost about \$675,000. The present city hall is a three-story brick structure. A county court house is to be erected on the corner of Benefit and College streets. The Narragansett hotel, in course of construction, is to be of stone, brick, and iron, seven stories high, covering 22,000 sq. ft. There are several small public squares. Roger Williams park, containing about 100 acres, is near the W. shore of Narragansett bay, in the S. part of the city; it was devised to the city in 1871 by Betsy Williams, a descendant of Roger Williams. The north burying ground, in the N. part of the city, is the property of the municipality; it contains 122 acres. Swan Point cemetery, on the E. bank of the Seekonk river, embraces a large tract of beautifully diversified land, laid out at a great cost and elegantly ornamented.—The following railroads connect Providence with the principal points in New England: Boston and Providence; Hartford, Providence, and Fishkill; New Bedford; Providence, Nantucket, and Cape Cod; Providence and Springfield; Providence and Stonington; Providence and Worcester; Warwick; Fall River, Warren, and Providence; and Providence, Warren, and Bristol. All of these except the last two occupy the same passenger depot, a spacious and elegant structure of brick nearly 700 ft. long, situated near the heart of the city on the S. side of the cove, and near the great bridge. Horse cars run through different parts of the city and to the adjoining towns. A daily passenger line and a semi-weekly freight line of steamers ply to New York, and steamers also run to Philadelphia, Baltimore, Norfolk, and Charleston, and to Fall River, Newport, and various points on Narragansett bay. During the colonial period Providence enjoyed an extensive foreign

commerce, which has now greatly fallen off, and its commerce is chiefly confined to the coasting trade. The value of foreign commerce for the year ending June 30, 1875, was \$589,545 (\$23,086 exports and \$566,459 imports). The number of arrivals from foreign ports during the same year was 148; of coastwise arrivals, 5,852; number of vessels belonging to the port at the close of the year, 142, tonnage 36,995.—Providence is the leading market for the trade in domestic printing cloths. The sales since 1864 have been as follows:

YEARS.	No. of pieces.	YEARS.	No. of pieces.
1864.....	2,697,150	1870.....	5,540,800
1865.....	4,112,700	1871.....	6,612,800
1866.....	2,953,700	1872.....	4,742,800
1867.....	2,688,000	1873.....	8,888,100
1868.....	4,701,900	1874.....	2,648,210
1869.....	2,175,000		

The pieces average 43 yards each. Its manufactures are very extensive, and include cotton and woollen goods, iron, gold, and silver wares, and numerous other articles. The American screw company possesses five large mills and five storehouses, besides other buildings; the mills have a capacity for the employment of about 2,500 hands, and for the production daily of nearly 40,000 gross of wood screws, several tons of rivets, large quantities of machine screws, stove bolts, coach screws, tire bolts, &c. The Providence tool company produces heavy and ship chandlers' hardware, sewing machines, and the Peabody breech-loading rifle; the works cover more than five acres and employ 1,500 hands. The Providence steam engine company manufactures the Greene cut-off engine, and also steam boilers and riveting machines. The works of the Barstow stove company cover more than two acres. The Allen fire department supply company manufactures steam fire engines, fire hose, hose carriages, hose couplings, discharge pipes, hydrants, fire escapes, &c.; it has a brass foundry in connection with its works, in which brass finishing is extensively carried on. The manufacture of gold jewelry is the most prominent industry of the city; more than 150 establishments of all sizes are engaged in it, and the annual product is about \$5,000,000. The Gorham company's manufactory of solid silver ware employs nearly 400 hands, and is the leading silver manufactory of the world. There are several establishments for the refining of gold and silver, in which are smelted large quantities of sweepings and refuse obtained from the jewelry establishments. About 25 establishments are engaged in the manufacture of woollen cloths, yarns, &c., and worsted goods; and about 50, with 150,000 spindles, in the manufacture of printing cloths, yarns, battings, thread, spool cotton, lacings, braids, and other cotton goods. The Fletcher manufacturing company employs 500 hands, and is the largest

establishment in the country, and probably in the world, engaged in the manufacture of "small wares," comprising boot, shoe, and corset lacings, lamp wicks, yarns, braids, &c.; the buildings cover four acres. There are three large cloth-printing establishments, and several shops for the engraving of copper rollers for printing calicoes. Among other establishments, the Rumford chemical works (in East Providence), the manufactory of Perry Davis's "pain killer," the Corliss steam engine works, the stove works of Spicers and Peckham, and the Rhode Island locomotive works are noteworthy. There are also several bleaching and calendering establishments, and manufactories of alarm tills, toilet and laundry soaps, ribbons, &c. Providence contains 23 national and 12 state banks, with an aggregate capital of \$17,707,850; 10 savings banks, with deposits to the amount of \$25,807,905; 1 trust company, capital \$500,000; 1 safe deposit company, capital \$50,000; and 20 insurance companies, with assets to the amount of \$13,175,629.—The city is divided into 10 wards, and is governed by a mayor, a board of aldermen of 10, and a common council of 40 members, elected annually. The mayor, aldermen, and common council in their joint capacity are styled the city council. At the close of 1874 the police force numbered 190 men. The number of arrests during that year was 8,440, of which 4,950 were for drunkenness. There is an effective paid fire department, consisting of 146 officers and men organized into five steam engine companies, six hose companies, and three hook and ladder companies. The city is supplied with water from the Pawtuxet river, 6 m. distant, by works recently constructed at a cost of about \$4,250,000. Since 1855 much attention has been given to vital statistics in Providence, and the returns of births, marriages, and deaths are probably more complete and perfect than those of any other city in America. During the same time special efforts have been made for the prevention of disease. In addition to this there are some peculiarities of natural location and internal construction which make the city very healthy. During the year 1873, with a population of 80,592, there were 1,719 deaths, 1,150 marriages, and 2,128 births; or one birth in 37·83, one person married in 35·04, and one death in 46·88 of the population. The annual average for 19 years, 1855 to 1873 inclusive, was one birth in 34·19, one person married in 38·10, and one death in 50·65 of the population. The valuation of real estate in 1874 was \$81,040,300; personal estate, \$42,642,500; total, \$123,682,800; rate of tax, \$14 50 per \$1,000; amount of tax, \$1,793,400 60. The receipts into the city treasury during the year ending Sept. 30, 1874, including a balance on hand of \$177,159 67, were \$7,968,233 36, of which \$1,520,716 68 was from taxation, \$5,722,289 52 from loans, and \$184,574 90 from water works. The expenditures were \$7,505,-

590, of which \$6,158,354 05 were classed as extraordinary and \$1,347,235 95 as ordinary; balance in treasury Sept. 30, 1874, \$462,643 36. The funded debt on Sept. 30, 1874, was \$5,400,000; floating debt, \$2,043,800; total, \$7,443,800. Deducting \$1,493,748 64 assets available for its reduction, the net debt was \$5,950,051 36.—Providence has many charitable institutions and associations. The Butler hospital for the insane, founded in 1847, is on the W. bank of Seekonk river, surrounded by extensive grounds, 60 acres of which are under cultivation, with about the same extent of native woodland. The average number of patients is about 130. The edifice was erected and the lands purchased by subscription, Cyrus Butler contributing \$40,000, and Nicholas Brown \$30,000. Its annual net disbursements are about \$55,000. The state of Rhode Island makes an annual appropriation of \$2,000 to enable the governor to aid poor insane persons there, and it also pays a portion of the expenses of all such poor insane as the town may choose to send. The Dexter asylum for the poor is situated on high land E. of the river. It is a fine edifice of brick, 170 ft. long, including wings, and three stories high. The grounds, which comprise about 40 acres, are enclosed with a stone wall 8 ft. high. The land was devised by Ebenezer Knight Dexter in 1824, and the buildings erected by the city in 1828. The Rhode Island hospital, founded in 1863, has stately buildings surrounded by pleasant grounds, in the S. part of the city, fronting on the harbor. Other important institutions are two homes for the aged, the nursery, a Roman Catholic orphan asylum, and two dispensaries. The reform school, established in 1850, for juvenile offenders between the ages of 8 and 18, is in the S. W. part of the city. The number of inmates at its last annual report, 1874, was 220, of whom 179 were boys and 41 girls. Its expenses for the year were \$40,753; earnings, \$13,222. The state prison is on the N. side of the cove. At the close of the year 1874 it contained 67 convicts. The county jail is within the prison walls. The convicts are almost exclusively employed in cabinet work and shoemaking.—The following are the statistics of public schools for 1873-'4:

SCHOOLS.	No. of schools.	No. of rooms.	Whole number of teachers.	No. of male teachers.	No. of female teachers.	No. of pupils.
High school.	1	9	12	4	8	393
Grammar schools.	7	60	68	7	61	2,687
Intermediate.	26	50	55	..	55	2,128
Primary....	29	64	86	..	86	8,962
Evening....	7	13	87	37	50	2,074
Vacation....	6	6	17	..	17	1,200
Total.....	76	202	325	48	277	12,439

There were also seven special teachers. The expenditure for school purposes in 1873 was \$267,597 25, viz.: salaries, \$146,656 13; houses and lots, \$91,738 97; incidental expenses, \$29,202 15. The schools are under the immediate

supervision of a superintendent, but the general control is vested in a school committee, consisting of the mayor and president of the common council *ex officio* and six members from each ward, whose term of office is three years. The Friends' yearly meeting boarding school, or "Quaker college," occupies a lot of 43 acres in the E. part of the city. It consists of two spacious brick buildings, three stories high with wings of two stories. It is liberally endowed and in a prosperous condition. A legacy of \$100,000 was bequeathed to it by the late Obadiah Brown. It was established in 1819, and is under the direction of a committee of the New England yearly meeting. The Roman Catholics have three flourishing academies, one male and two female. The grounds and buildings of Brown university occupy an elevated situation in the E. part of the city. (See BROWN UNIVERSITY.) The Athenæum, incorporated in 1836, is a handsome granite building, containing a reading room and a well selected library of 34,000 volumes, to which large additions are annually made. The Rhode Island historical society, founded in 1822, occupies a fine brick and granite building opposite the university grounds, erected in 1844, and containing a library of 6,000 volumes and 35,000 pamphlets, besides a large collection of manuscripts and other memorials relating to the history of the state. The Franklin society, incorporated in 1823, has for its object the cultivation and dissemination of a knowledge of the natural sciences and the mechanic arts. The Franklin lyceum has a reading room and a library of 8,000 volumes. The mechanics' and apprentices' library numbers 6,500 volumes, and that of the young men's Christian association 5,000. Steps have been taken toward the establishment of a free public library. Four daily, one semi-weekly, and five weekly newspapers, and three monthly periodicals are published. There are 76 churches, viz.: 13 Baptist, 2 Christian, 7 Congregational, 12 Episcopal, 1 Evangelical Lutheran, 5 Free Baptist, 1 Friends', 2 Jewish, 10 Methodist Episcopal, 1 Presbyterian, 10 Roman Catholic, 1 Swedenborgian, 3 Unitarian, 1 United Presbyterian, 2 Universalist, and 5 miscellaneous. The first Baptist church, the oldest in America, was founded here in 1638.—Providence was first settled in 1636 by Roger Williams, who was banished from Massachusetts on account of his religious opinions, and who, in his new colony, was the first to propose and establish the principles of universal freedom in religious matters. The rock on the banks of the Seekonk river on which he landed, and where he was received by the Indians, is about a mile from the centre of the city. The town received its first patent from Charles I., bearing date 1643. It suffered much in the famous war of King Philip, in 1675, when a considerable portion of it was burned. It again suffered severely in September, 1815, when a southeasterly storm forced an extra-

ordinary tide into the harbor, raising the water 12 ft. higher than the usual spring tides, spreading devastation and ruin along the wharves and the lower part of the town, overturning houses and stores, and doing much damage to the shipping. One large East Indiaman was driven up beyond the cove, and never removed. Providence received a city charter in 1832. The first printing press was established here by William Goddard in 1762, from whose office the "Providence Gazette" was issued.

PROVIDENCE, Sisters of. See SISTERHOODS.

PROVINCETOWN, a town of Barnstable co., Massachusetts, occupying the extremity of Cape Cod, at the terminus of the Cape Cod division of the Old Colony railroad, 120 m. by rail and 55 m. by water S. E. of Boston; pop. in 1850, 3,157; in 1860, 3,206; in 1870, 3,865. The town is 4 m. long by 3 m. in width at the widest part. The harbor is on the inner side of the cape, and is almost entirely landlocked. It is unsurpassed for size and depth of water, covering an area of 3 by 5 m., 30 fathoms deep in the deepest parts, without rocks, bars, or shoals. The village skirts the shore of the harbor, and is formed of wooden buildings, compactly built, presenting a beautiful view from the water. Provincetown is a popular summer resort. It is noted for its cod, mackerel, and whale fisheries. In 1875 there were owned here 185 vessels, with an aggregate tonnage of 16,000, of which 20 were employed in coasting, 19 in whaling, and 146 in the cod and mackerel fisheries. The average annual catch of codfish for the four years ending in 1875 was 80,000 quintals; of mackerel, 20,000 barrels. In whaling the town ranks with New London next to New Bedford. It contains three marine railways, 30 wharves, a national bank with a capital of \$200,000, a savings bank with deposits amounting to \$500,000, and three marine insurance companies with an aggregate capital of \$250,000. It has a fine fire department. The assessed value of property in 1875 was about \$2,000,000. There are 14 public schools (1 high, 1 grammar, and 12 intermediate and primary), supported at an annual cost of \$7,400, exclusive of repairs of building; a weekly newspaper; a public library of 2,200 volumes; and six religious societies.—In Provincetown harbor the Mayflower first cast anchor in America. Here the pilgrims signed the first compact of government, and here the first child in New England of English parentage was born.

PROVOOST, Samuel, an American bishop, born in New York, March 11, 1742, died Sept. 6, 1815. He graduated at King's (now Columbia) college in 1758, and in 1761 entered as fellow commoner of St. Peter's college, Cambridge, England. He was ordained in 1766, returned to New York, and was assistant minister of Trinity church till 1768. In 1770 he retired to a small farm in Dutchess co., remained there till the close of the revolution, and was then elected rector of Trinity church. He was chap-

lain to the continental congress in 1785, and to the senate of the United States in 1789. Having been elected bishop of New York in June, 1786, he accompanied Dr. William White to England, and was consecrated with him, Feb. 4, 1787, at Lambeth palace. In 1800, on account of his health, he resigned the rectorship of Trinity church, and in 1801 the episcopal office. The latter resignation was not accepted by the house of bishops, and Dr. Benjamin Moore was chosen his coadjutor.

PROVOST, Jean Baptiste François, a French actor, born Jan. 29, 1798, died Dec. 24, 1865. He studied at the conservatory in Paris, and became professor of elocution in 1839. He played at the Odéon theatre from 1819 to 1828, and at that of Porte Saint Martin till 1835, when he appeared at the Théâtre Français, of which he became a member in 1839. His most celebrated rôles as a tragedian were Claude in *Valérie* (1852), the marquis de Rieux in *Duc Job* (1858), the banker Charrier in Augier's *Effrontés*, and the deputy marshal in the same author's *Le fils de Giboyer* (1863-'4).

PRUDENTIUS, Aurelius Clemens, a Latin poet, born in Spain in A. D. 348, died early in the 5th century. He was a lawyer, became a civil and criminal judge, and was appointed to a high military station at court. In his later years he devoted himself to religious exercises and study. His extant poems are: *Præfatio*, giving a catalogue of his works up to his 57th year, with a brief autobiography; *Cathemerinon Liber*, 12 sacred hymns, some of which have been inserted in the liturgy of the Roman Catholic church; *Apotheosis*, maintaining the divinity of Christ and the doctrine of the Trinity; *Hamartigenia*, on the origin of sin, directed against the Marcionites; *Psychomachia*, representing the struggle between virtue and vice in the soul, and the triumph of the former; *Contra Symmachum Liber I.*, an account of the conversion of Rome, with an exposure of the folly of the ancient religion; *Contra Symmachum Liber II.*, a refutation of the argument of Symmachus in his petition to the emperor Valentinian; *Peri Stephanon Liber*, 14 poems in honor of martyred saints; *Diptychon* or *Dittochaon*, 48 poems in heroic hexameters, 24 describing events and characters in the Old Testament, and 24 in the New, about the authenticity of which there has been much controversy; and the *Epilogus*. The earliest dated edition of his works is that of Deventer (1472); the best is that of Faustus Arevalus (2 vols. 4to, Rome, 1788-'9). His works are also published in vols. lix. and lx. of Migne's *Patrologie latine*.—See Bayle, *Cathemerinon, traduit et annoté, avec une étude sur Prudence* (8vo, Paris, 1860).

PRUD'HON, Pierre Paul, a French painter, born at Cluny, April 4, 1758, died in Paris, Feb. 16, 1823. He was educated by charity, developed a taste for art, and was placed under the tuition of Devosges at Dijon. Having won a prize awarded by the states of Burgundy, he

went to Rome, where he became intimate with Canova. In 1789 he went to Paris, where he supported himself by painting miniatures and making drawings for concert tickets, bill heads, tradesmen's cards, and confectionery boxes. In 1794 he went to Rigney, near Gray, and executed a series of pastel portraits for which he received a handsome price. On his return to Paris he won a prize for an allegorical drawing, representing "Wisdom and Virtue descending upon earth." In 1805 he painted on a ceiling in the museum of the Louvre "Diana imploring Jupiter;" and in 1808, for the hall of the criminal court, "Justice and Divine Vengeance pursuing Crime." For this he received from Napoleon the cross of the legion of honor, was appointed teacher to the empress Maria Louisa, and became a member of the institute. He painted "Psyche borne away by the Zephyrs" (1808), "Zephyr balancing himself upon the Water," a portrait of the king of Rome, "Venus and Adonis" (1810), "Andromache" (1817), and "The Assumption" (1819). In 1821 his pupil Constance Mayer, for whom he entertained a warm affection, put an end to her life, and thenceforth he pined away. He nevertheless completed "The Indigent Family," the rough draught of which had been left by his unfortunate pupil, and "Christ dying upon the Cross," which was exhibited after his death.

PRUNE. See **PLUM**.

PRUNING, a most important horticultural operation, which consists in removing a portion of a plant for the benefit of that which remains. The operation may be required by all plants which have an above-ground stem, even the most delicate. It is performed either to induce a vigorous growth, or to diminish vigor and dwarf a plant; a tree which does not bear is pruned to increase its fruitfulness, or it may be pruned to prevent over production. It requires to be done understandingly; and so much injury has resulted from indiscriminate pruning, that certain cultivators go to an opposite extreme, and advise not to prune at all. Where trees grow in a dense forest we find tall straight trunks without a branch for 50 ft. or more, and at the top a small branching head, that in size is quite out of proportion to the trunk; when such trees are felled and sawed into boards, we see by the knots that a natural pruning has been carried on for years; the lower branches of the trees were so excluded from the light by the growing tops that they were smothered and fell away, while the wounds were closed so neatly that no external indication of their presence is manifest. Trees of the same species with those which grow in the forest, when found as isolated specimens, are much shorter, but clothed with branches from the base upward. In this country pruning has until recently been regarded as belonging only to fruit trees, but in those parts of Europe where forestry is a distinct art, forest trees are pruned with a view to their

future uses for timber, and while some are made to grow with a clear straight trunk, in other cases their branches are encouraged and so directed as to form knees required in ship building. In this country pruning is most fre-

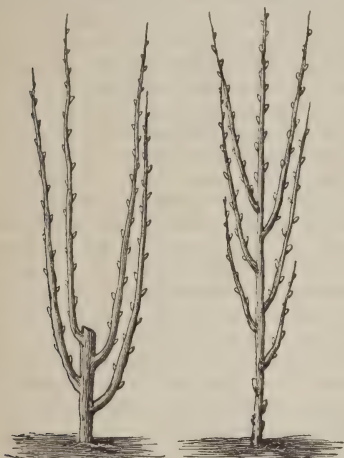


FIG. 1.—A Young Tree Pruned and Unpruned.

quently done upon old orchards, in which the trees have been left to themselves since they were first planted, and are unfruitful except on the extreme outer twigs on account of the crowded condition of their heads, in which branches cross one another in a confused mass, impenetrable to light and air. In such cases all that need be done is to remove the superfluous wood in such a manner as to leave an evenly balanced and open head. The intelligent fruit grower will prefer to set trees only one year old from the bud or graft, and they will be either simple wands or stems, furnished with buds along their length, or a few of the upper buds may have pushed and formed branches; with a tree like this to start with, he can form the head at such height as best

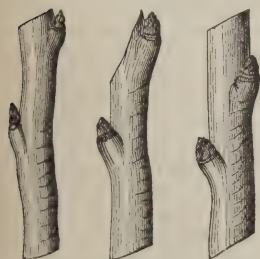


FIG. 2.—Right and Wrong in Pruning.

til those at its lower part, being robbed of all nourishment by the rapidly growing shoots above, will not start at all. Such a branch or tree as this may be cut back so that the lower buds only will start and produce shoots, which

will ripen into three or four branches, and these will be strong, from having all the nutriment that would have been divided among numerous shoots were it left unpruned. Similarly the ramification, and consequently the whole head of the tree, may be directed and controlled at will. The effects of judicious pruning upon young trees are strikingly shown in apple and pear trees, which at the end of four or five years of systematic pruning are complete pyramids, with the base near the ground, and the branches equally distributed and gradually diminishing in size to the top.—Pruning is frequently resorted to when trees have become stunted and almost ceased to grow; if the top of such a tree has its branches judiciously cut back, the remaining buds, having to themselves the sap which was formerly divided among the whole, will produce vigorous new shoots, and this will be responded to by a new growth of roots, and the whole tree will be invigorated. These instances have reference to the wood growth of the tree; whatever favors that diminishes the production of fruit, and *vice versa*; hence the pruning to induce fruit-bearing is quite different from that to promote vigor of growth. If a tree is severely pruned soon after its leaves are developed, it receives a sudden check, and it is the tendency of all such shocks to induce the tree to propagate itself by seed; instead of preparing for an extended growth of branches the next year, many of the buds, which would otherwise have produced leafy shoots, become fruit buds. In practice, pruning to produce fruit is not done in this severe manner, but by stopping the extension of a portion of the shoots after they have made a certain growth; as this is done when the shoots are so tender as not to require a knife, it is termed pinching. By careful management the form and fruitfulness of trees may be controlled with but little use of the knife; buds which would produce branches where they are not wanted are broken off soon after they start to grow, and by checking the prolongation of other branches at the proper point an equal distribution of sap, and consequently of growth, is maintained over the whole tree.—Root pruning, or removing a portion of the roots, is resorted to for the purpose of controlling the size of the tree, to produce fruit-



FIG. 3.—A Pyramidal Tree, produced by proper Pruning.

fulness, and to allow the tree to be transplanted. Some trees, especially forest and ornamental ones, produce long roots with very few fine fibrous rootlets, and are difficult to remove unless prepared a year beforehand; the long roots being cut off within a moderate distance of the trunk, the shortened roots will form numerous rootlets, and at the end of a season may be transplanted with safety. Root pruning is one of the readiest methods of checking the too vigorous wood growth of trees and throwing them into bearing; it consists in opening a circular trench around the tree, at a distance governed by the kind and the vigor of the individual, and cutting off with a sharp spade all roots which extend outside of this circle; sometimes half the roots are operated on one year and the other half the next.—The proper time for pruning trees has been the subject of much discussion; wounds heal over most rapidly if made after the season's increase in length is completed, and the fully developed leaves are engaged in maturing the buds and preparing for the growth of another year. This time, since it occurs in summer, is usually an inconvenient one, and the end of winter or very early spring, before vegetation starts, is the season generally selected; this has reference to the removal of branches. Summer pruning, or pinching, is done at the time when its objects can be best accomplished. Whenever it may be performed, the utility of pruning will depend upon the intelligence of the operator, who should understand the laws of plant growth and the peculiar habit of each tree. The peach, for example, produces its flowers and fruit along the branches which grew the preceding year, and is generally much benefited by having these branches shortened in, or cut back, for one third or more of their length; the horse chestnut, on the other hand, produces its flowers and fruit from buds at the ends of branches of the previous year, and if the cutting back so useful to the peach were practised on this, all the flowers would be destroyed. In some plants, like the grape, there are several different methods of pruning to obtain the same result. With the grape, pruning is so intimately related to training that it is difficult to treat of the two separately, and this is especially the case with fruit trees grown upon walls and trellises, whether as espaliers or by the cordon method. In this country the climate does not require the highly artificial methods of training, and the pruning to effect them, so common in Europe; these are given in various English and French works upon fruit culture, and with special completeness in Du Breuil's *Cours élémentaire d'arboriculture*.—As a mechanical operation, pruning requires some skill and care; large cutting is done with a saw made for the purpose, the teeth of which are set wide. An axe should never be used. The wound made by the saw should be smoothed with a drawing knife or other tool, and

covered with shellac varnish, melted grafting wax, or thick common paint, to prevent decay before a new deposit of wood and bark covers it. Every branch should be cut close to the trunk, or other branch to which it is attached; if a stub, or projection of a few inches, be left, this will not heal over, but in time decay will set in, which may extend to the whole interior of the tree. The decay of many orchards may be traced to this fault in pruning. For the removal of branches two inches in diameter or less, a heavy chisel made for the purpose, and driven from below upward with a mallet, makes quick and neat work. A heavy knife is used for the removal of twigs, and for shortening young growths; shears made for the work do it quicker, but do not leave so clean a cut as the knife, though in many cases they answer. In shortening a twig or small branch, the cut should be made at a bud, and as the shoot from this will continue the upward growth of the branch, it is of some importance to cut to a bud pointing in the desired direction, as the future shape of the tree will be materially influenced by it. Cutting must not be done too far above a bud, as this will leave a stub which, having no leaves to sustain it, will die down to the bud; if the cut is made too close to the base of the bud, there is danger that it will dry out or be otherwise injured; the proper cut is made by placing the knife at a point opposite the base of the bud, and bringing it out, with a slightly upward slanting cut, opposite the apex of the bud.

PRUSA, or Prusias. See BRUSA.

PRUSSIA, the largest and leading state of the German empire, occupying a northern central portion of the European continent, between lat. 49° and 56° N., and lon. 5° 45' and 23° E. It is bounded N. by the North sea, Denmark, and the Baltic; E. by Russia; S. by Cisleithan Austria, the kingdom of Saxony, the Thuringian states, Bavaria, Hesse, and Alsace-Lorraine; and W. by Luxemburg, Belgium, and Holland. Its greatest length, from a point near where the Niemen or Memel crosses the N. E. frontier to the point of junction of its boundaries with those of Luxemburg and Alsace-Lorraine, is 800 m.; the longest line that can be drawn on its soil in a direction nearly at right angles to this extends from the Baltic coast N. W. of Stralsund to the S. E. extremity of the province of Silesia, and measures a little more than 400 m. The area of Prussia, according to the official figures which are made the basis for the land tax (but which, owing to very recent territorial changes, are perhaps not absolutely accurate), is 136,656 sq. m. including the area of all the principal gulfs, bays, and arms of the sea, and 134,496 sq. m. excluding all bodies of water except inland lakes. The kingdom is divided into 12 provinces (inclusive of the detached Hohenzollern, and exclusive of Lauenburg), and these into administrative districts named after their respective chief towns, as follows:

PROVINCES.	Area, sq. miles.	DISTRICTS.
Prussia.....	24,114	Königsberg, Gumbinnen, Dantzic, Marienwerder.
Brandenburg.....	15,403	(Berlin), Potsdam, Frank- fort-on-the-Oder.
Pomerania.....	11,630	Stettin, Köslin, Stralsund.
Posen.....	11,179	Posen, Bromberg.
Silesia.....	15,556	Breslau, Liegnitz, Oppeln.
Saxony.....	9,746	Magdeburg, Merseburg, Er- furt.
Schleswig-Holstein.....	6,766	Schleswig.
Hanover.....	14,856	Hanover, Hildesheim, Lüne- burg, Stade, Osnabrück, Aurich.
Westphalia.....	7,799	Münster, Minden, Arnberg.
Hesse-Nassau.....	6,138	Cassel, Wiesbaden.
The Rhine Province.....	10,416	Coblenz, Düsseldorf, Co- logne, Treves, Aix-la-Cha- pelle.
Hohenzollern.....	440	Sigmaringen.
Total.....	134,043	
Duchy of Lauenburg.....	453	
Grand total.....	134,496	

Until 1866 the territory of Prussia was not only divided into two portions by the kingdom of Hanover, the electorate of Hesse, and other foreign possessions lying in its midst, but was also dotted here and there by small independent principalities and duchies, which greatly hindered its unity of action and made its political geography extremely complicated. These have all been absorbed since the war of 1866, with the exception of the following small states and tracts of land, which are still subject to other German powers, though surrounded by Prussian territory: three communes in the province of Brandenburg, belonging to Mecklenburg-Schwerin; the city of Hamburg and vicinity, with tracts belonging to it in Holstein and Hanover; the duchy of Anhalt, divided into eight portions; the duchy of Brunswick, also in eight portions; the principalities of Schaumburg-Lippe (in two portions) and Lippe-Detmold; the principality of Waldeck (in two portions); Allstedt and Oldisleben, a territory belonging to Weimar (in two portions); Volkerode, belonging to Gotha; territories belonging to Schwarzburg-Sondershausen and Schwarzburg-Rudolstein; the village of Mumsdorf, belonging to Altenburg; the Hessian province of Upper Hesse, with a territory belonging to it in the province of Hesse-Nassau; the principality of Birkenfeld in the Rhine province, belonging to Oldenburg; two tracts owned by Baden and three by Würtemberg in the Hohenzollern domains. The larger territory of the duchies of Mecklenburg-Schwerin and Mecklenburg-Strelitz (with the adjoining Lübeck and a detached portion of Oldenburg) in the north, and the grand duchy of Oldenburg (with the adjoining Bremen) in the northwest, each surrounded by Prussian territory on three sides, but having their own seacoast, are now the only states of consequence which break in upon the outline and territorial unity of the country.

In addition to the united territory enclosed by the boundaries given above, Prussia has the following outlying possessions: six communes and domains in Mecklenburg-Schwerin; Grossmenow in Mecklenburg-Strelitz; a commune, formerly belonging to Hanover, in the territory of Hamburg; seven communes in Anhalt; four tracts in Brunswick; one in Oldenburg; the town of Lügde between Lippe-Detmold and Waldeck; two villages in Waldeck; Kischlitz in Saxe-Altenburg; the circle of Ziegenrück, in six portions, lying near Meiningen, Weimar, Rudolstadt, &c.; Moleschütz, Abtlöbnitz, and Barchfeld in Saxe-Meiningen; Wandersleben and Mühlberg in Saxe-Gotha; the circles of Schleusingen and Smalcald in Thuringia, in several divisions; and the domains of the Hohenzollerns, in eleven portions, scattered through the territory of Baden, Würtemberg, and Bavaria. The duchy of Lauenburg belongs to the king of Prussia, without being consolidated with the kingdom. (See LAUENBURG.)—The coast line of Prussia on the North sea is about 250 m. long; on the Baltic it measures about 750 m. On both seas the shore is almost uniformly flat and low; so much so that at several points on the North sea, and where the province of Prussia borders on the Baltic, dikes have been built to protect the tracts of nearly level land that stretch away from the water's edge, parts of them lying lower than the surface of the ocean. The only exceptions to this formation are the more rugged coasts of N. E. Schleswig, and the high chalk cliffs of the island of Rügen, lying in the Baltic off Stralsund. On the North sea the Dollart (the estuary of the Ems), the bay of Jade, and the estuaries of the Weser and Elbe, form excellent harbors, their ports being respectively Emden, Wilhelmshaven, Bremen, and Hamburg; while on the Baltic the best are those of Kiel, Stralsund, Stettin, and Dantzic, the last two respectively at the mouths of the Oder and Vistula. The chief gulfs and bays are formed on both seas by the broadening estuaries of the rivers named, the Oder and Vistula forming at their mouths large bodies of water almost enclosed by land, known respectively as the Stettiner Haff and the Frisches Haff, while the Kurisches Haff, at the extreme N. E. of the coast, is a similar body receiving the river Memel.—The greater part of the surface of Prussia is flat and low; an extended plain, sloping toward the north, and only broken by small detached ranges of hills, forms the northern portion. The direction of such ranges is in almost every case N. E. and S. W.; but the highest of their summits in the north is the Thurmberg, near Dantzic, 1,131 ft. The surface of the S. part is more varied, and some portions of it are mountainous and picturesque. The S. W. boundary of Silesia is formed by the Riesengebirge (highest peak about 5,300 ft.) and its various continuations. The N. and E. parts of the province of Saxony form almost a perfect level, interrupted only

by inconsiderable hills; the S. W. portion is intersected by projecting spurs of the Hartz mountains (highest elevation the Brocken or Blocksberg, 3,737 ft.), and the Thuringian forest. Westphalia, the Rhine province, and Hesse-Nassau contain the N. W. group of the mountain system of Germany, each of its numerous ridges having its own distinctive name. The more important are: on the right bank of the Rhine, the Taunus, the Weser hills, including the picturesque gap known as the Porta Westphalica, the Tentoburg forest (the battle ground of the Germans and Romans), the Rothhaar hills, the Sauerland hills (2,800 ft.), the Siebengebirge, the Westerwald, the Spessart, the Rhön, and offshoots from the Vogelsberg; on the left bank of the Rhine, the Hunsrück, Hohe Venn, and Eifel (2,500 ft.). The Hohenzollern territory is intersected by the Raue Alp.—Prussia contains a large number of lakes, especially in the level N. E. section, but none of them are of much importance. (For the principal lakes see GERMANY, vol. vii., p. 746.) There are large swamps on the lower course of the Havel, Oder, Warthe, and Netze rivers, which many attempts have been made to drain. All the river systems of Prussia belong to the basins of the Baltic and North seas. The principal rivers belonging to the basin of the Baltic are the Memel, Vistula (with its tributaries the Drewenz and Brahe), and Oder (with its tributaries the Bartsch, Bober, Neisse, and Warthe). Independent of these are a number of coast rivers, viz., the Dange, Pregel, Passarge, Elbing, Leba, Lupow, Stolpe, Wipper, Persante, Rega, Ihna, Peene, Ucker, Recknitz, and Trave, nearly all of them navigable for some distance. Belonging to the North sea basin are the Eider, the Elbe (with its tributaries the Mulde, Saale, and Havel), the Weser, formed by the Werra and Fulda (with its tributary the Aller), the Ems (with the Vechte), and the Rhine. The Rhine flows through Prussian territory about 200 m., entering it at Mentz, forming about 29 m. of the boundary of Hesse-Darmstadt, receiving on the right bank the Main, Lahn, Wied, Sieg, Wipper, Ruhr, and Lippe, and on the left bank the Nahe, Moselle, and Ahr, and passing into Holland a little below Emmerich. Prussia has a large number of artificial watercourses, the Vistula and Oder being connected by the Bromberg canal, the Oder and Spree (an affluent of the Havel) by the Müllrose canal, the Havel and Elbe by the Plau canal, the Elbe and Trave by the Stecknitz canal, and the Eider and the Baltic by the Eider canal. Other canals connect small adjacent river systems in the western provinces.—The climate is wholesome and temperate. The mean temperature at Königsberg is 43° F., at Berlin 48°, at Aix-la-Chapelle 49°, and at Cologne and Treves 50°. The soil, though in some mountainous districts of the western section extremely desolate and sterile, and in a large division of the middle provinces a poor loamy sand, is on the whole

fertile, and preëminently so in the bottoms of the Elbe, Saale, Unstrut (an affluent of the Saale), Oder, Warthe, Netze, and some other rivers. Even where it is naturally poor, a well developed system of agriculture, assiduously fostered by the government, renders it highly productive.—The population of Prussia, according to the census of 1871 (corrected tables of 1873), was as follows:

Prussia.....	8,137,545
Brandenburg.....	2,863,229
Pomerania.....	1,481,638
Posen.....	1,583,843
Silesia.....	3,707,167
Saxony.....	2,103,174
Schleswig-Holstein.....	995,873
Hanover (including the Jade district).....	1,963,618
Westphalia.....	1,775,175
Hesse-Nassau.....	1,400,370
Rhine Province.....	8,579,347
Hohenzollern.....	65,558
Soldiers and sailors not included above.....	37,409
Total.....	24,643,951
Duchy of Lauenburg.....	49,546
Grand total.....	24,693,497

The excess of females over males was 357,542. Of the entire population about 21,800,000 speak German, 146,800 are Lithuanians, 2,420,000 (in Prussia, Posen, and Pomerania) Poles, 50,000 (in Silesia) Czechs, 83,000 (in Silesia and Brandenburg) Wends, 10,400 (in the Rhine province) Walloons, and 145,000 (in Schleswig-Holstein) Danes. Prussia has one city (Berlin) of more than 900,000 inhabitants (in August, 1873, 909,580), 5 of from 100,000 to 210,000 (Breslau, Cologne, Magdeburg, Königsberg, and Hanover), 12 of from 50,000 to 100,000 (Frankfort-on-the-Main, Dantzic, Stettin, Barmen, Elberfeld, Aix-la-Chapelle, Altona, Düsseldorf, Crefeld, Posen, Halle, and Essen), and 6 of from 40,000 to 50,000 (Cassel, Dortmund, Potsdam, Erfurt, Frankfort-on-the-Oder, and Gölitz). The number of births in 1872 was 1,023,005, of which 73,527 were illegitimate and 40,505 still-born; of deaths, 765,360; of marriages, 255,421. The number of emigrants from 1844 to 1872 was 706,562; of immigrants, 110,973.—Of the total area of the kingdom, 50·1 per cent. consists of tilled fields, gardens, vineyards, and orchards, 18·3 meadows, 23·1 woodland, and 8·5 unproductive land. All kinds of grain are produced in abundance in Prussia proper, Posen, Silesia, and Saxony, all of which export breadstuffs to the other provinces or to foreign countries. An average grain crop is estimated at 53,000,000 bushels of wheat, 194,000,000 of rye, 34,000,000 of barley, and 154,000,000 of oats. Of potatoes about 495,000,000 bushels are raised. Spelt, peas, rape seed, dyestuffs, herbs, flax, hemp, chicory, hops, and beets (chiefly used for the sugar manufacture) are cultivated in large quantities in all parts of the kingdom. Tobacco is largely raised in western and central Prussia, but has of late considerably decreased in amount; the produce of raw tobacco in 1869 was about 17,000,000 lbs. Of the vineyards full four fifths are on the Rhine and its tribu-

taries; their average yield is about 10,000,000 gallons. Wine of good quality is produced only near the Rhine; those brands which are produced in Saxony (Naumburg) and Silesia (Grüneberg) are proverbially bad. The forests furnish an abundance of excellent timber and lumber. In the raising of domestic animals the progress of Prussia since its reconstruction after the wars of Napoleon has been more marked than in any other agricultural pursuit. The breed of horses has been so improved by government studs, that not only are all the horses wanted for army purposes obtained within the state, but large numbers are exported to neighboring countries. In 1873 the total number of horses was 2,278,274, of cattle 8,612,150, of sheep 19,624,758, and of swine 4,278,531. Hogs are most numerous in Westphalia, geese in Pomerania, bees in Brandenburg and Westphalia, and goats in the mountainous districts; poultry is abundant everywhere. The fisheries on the shores of the Baltic and on the lakes and rivers are important, and all kinds of game common to central Europe are found in the forests. Wolves are seen only in Prussia proper and Posen, where also a few specimens of the aurochs and elk are carefully preserved. The lynx, fox, badger, marten, beaver, otter, and wild fowl are met with in different parts of the kingdom. Seals are sometimes caught in the Baltic.—Mining industry advanced with astonishing rapidity within the second quarter of the present century; it received a temporary check in 1858, but has since made great progress, especially in the production of coal, iron, and zinc. In 1872 the total number of mines in Prussia was 2,702, among which were 476 coal mines, 544 of brown coal, 1,559 of iron, 130 of lead, 82 of zinc, 39 of copper, 5 of vitriol, 46 of manganese, and 1 of cobalt, employing 225,936 hands, including women and children. The total value of mining products was \$82,460,000. The production of coal in 1872 amounted to 581,000,000 cwt., that of brown coal to 146,000,000 cwt. In the production of raw iron Prussia exceeds all other states of the European continent; in the production of zinc all the countries of the world. The value of the products of furnaces, founderies, puddling works, &c., in 1872, was \$59,000,000. About 9,280,000 cwt. of salt was produced in that year. A very small quantity of gold is found; and agate, amethysts, alabaster, marble, gypsum, clays, &c., are obtained. Amber is found on the Baltic coast. Among the mineral springs of Prussia the following enjoy the widest reputation: Warmbrunn, Salzbrunn, Reinerz, and Landeck in Silesia; Freienwalde in Brandenburg; Lauchstädt in Saxony; Driburg in Westphalia; the sulphur springs of Aix-la-Chapelle; Wiesbaden, Ems, Selters, Schwalbach, and Homburg in Hesse-Nassau.—Up to the beginning of the present century Prussia was mainly an agricultural and military state. Even the efforts of Frederick the Great to

introduce new branches of manufacture were in the main unsuccessful. It was only after the final abolition of serfdom (Oct. 9, 1807), the introduction of municipal self-government (Nov. 19, 1808), and the removal of the mediæval institution of trade guilds (Oct. 28, 1810), that manufacturing industry began to take root in Prussia. Soon after Napoleon's downfall the government turned its earnest attention to fostering home manufactures, and during the past 50 years the industry of Prussia has steadily and rapidly advanced. In 1806 the population of Prussia was 10,000,000, with an average income of \$10 to each inhabitant; the capital invested in manufacturing establishments little exceeded \$200,000,000, and the number of free laborers was 480,000. In 1856 the average income of over 17,000,000 inhabitants was \$42 each, the capital invested in manufactures \$770,000,000, and the number of free laborers 2,771,000. In 1872 the total income of the 24,600,000 inhabitants was estimated at \$1,880,000,000, an average of \$76 to each inhabitant. A powerful impulse has recently been given to Prussian industry by the results of the Franco-German war. The increase of capital and the strengthened confidence of the capitalists in the lasting prominence of Prussia and Germany led to the establishment of a large number of new manufactories and the enlargement of many old ones. Among the new branches of industry the manufacture of beet sugar stands foremost, the number of factories in 1873 amounting to 257. The introduction of the cotton manufacture has been attended with great losses. In 1846 the number of spindles was 194,290; in 1856, 289,000; in 1866, about 600,000. The linen manufacture has been developed to the greatest perfection in Silesia and Westphalia, and has of late assumed larger dimensions in the provinces of Hanover and Hesse-Nassau. Among the most prosperous manufactures of the kingdom is that of woollen goods, which is chiefly carried on in the two Rhenish districts of Aix-la-Chapelle and Düsseldorf and in the provinces of Brandenburg, Saxony, and Silesia. Large manufactories of silks are found in the Rhine province, Westphalia, and Brandenburg. Hardware of all kinds is manufactured in all the provinces except Prussia proper and Posen. The machine shops of Berlin rival the largest establishments of the kind in England, while the great iron and steel works of Krupp at Essen are now the most extensive and famous in the world. Solingen and Suhl are celebrated for cutlery and guns; Silesia for castings and sheet iron; Westphalia for scythes and needles. In 1868 the iron works of Prussia produced 10,279,000 cwt. of bar and rolled iron, 2,408,000 of steel, 1,781,000 of sheet iron, 862,156 of iron wire, and 3,490,000 of castings. Rapid as the increase of the production of raw iron has been, it has not been able to keep pace with the increase of consumption. The manufacture of leather,

morocco, cordovan, &c., flourishes in Saxony, in Berlin, and in Prussia proper. In the manufacture of paper the progress has been more rapid even than in textile fabrics; it is carried on in the Rhine province, Westphalia, Brandenburg, Saxony, and Silesia. Chicory and starch are manufactured principally in Saxony, tobacco in all parts of the kingdom. The most extensive copper and brass manufacturing establishments are found in Saxony and on the Rhine. Glass ware, crockery, stoneware, and china are produced in large quantities, principally in the central and eastern provinces. The porcelain of Berlin rivals the best made in France. Tassels, fringes, trimmings, &c., are manufactured at Breslau, Magdeburg, Cologne, and Berlin; furniture and pianos at Berlin.—The postal arrangements of Prussia, which have long been celebrated for their admirable convenience, economy, and exactness, have now, in common with those of the other states of the German empire, passed into the hands of the imperial government, by which however their leading features are retained. The telegraphs, all of which are under state control, followed the same course. The aggregate length of the railway lines in operation in May, 1874, was 9,042 m., of which 2,520 m. were comprised in roads belonging to the state, 1,611 m. in roads of private companies managed by the state, and 4,911 m. in roads belonging to and managed by private companies. The rolling stock in 1872 consisted of 4,327 locomotives, 6,794 passenger cars, and 95,296 freight cars. The number of passengers carried over the roads in 1872 was 86,442,679; total freight, 1,550,000,000 cwt. In 1873 the commercial marine comprised 2,961 vessels (including river steamers), with an aggregate tonnage of 489,890, of which 1,104 were steamers. The entrances at the various ports in 1872 were 56,974 vessels, tonnage 4,613,228; clearances, 55,083, tonnage 4,611,598.—Until 1855 the Royal bank at Berlin (which had been transformed into a joint stock bank in 1846) was the only bank of issue. In December, 1873, the number of banks of issue was 12. The circulation of the Royal bank, which until 1850 had not exceeded \$15,000,000, rose to \$50,000,000 in 1857, and in December, 1873, amounted to \$215,000,000. In all the principal cities there are branches of the Royal bank. The Frankfort bank, in Frankfort-on-the-Main, had a circulation of about \$10,000,000, and the Hanover bank of \$2,800,000; the note circulation of each of the other banks does not exceed \$700,000. A peculiar moneyed institution of Prussia, first introduced by Frederick the Great, but since imitated in other countries, is the real estate bank (*Hypothekenbank*), originally intended to save the large landholders from the usurious practices of money lenders. These banks issue transferable mortgage bonds to the amount of one half or two thirds of the value of landed estates, the bank or association of landholders guaranteeing the principal and interest to the

holders of the bonds. The aggregate amount of such bonds exceeds \$330,000,000. The association of capital for commercial and industrial purposes, not including railways, turnpikes, or canals, has of late greatly increased. In December, 1872, the total number of companies was 1,041, of which 762 had been founded since June 11, 1870, the date of the promulgation of the new law on stock companies. Of the latter number 126 were banking, 28 insurance, 108 mining, 6 steamship, and 293 manufacturing companies. A large number of these companies disappeared again in consequence of the financial crisis of 1873-'4. The savings banks of Prussia are municipal institutions, belonging to the towns (*städtische Sparbanken*) or to the circles (*Kreis-sparbanken*). The aggregate deposits in them amount to more than \$113,000,000.—The system of public education in Prussia is one of the most thorough in the world. Instruction in the common branches is compulsory. It is difficult in Prussia to find adult persons unable to read. The number of common schools in 1873 was about 35,000, with over 3,700,000 pupils. The number of "middle schools," academies, apprentices' schools, Sunday schools, and industrial schools is very large, and increasing from year to year. In 1873 there were 32 provincial technical schools (*Gewerbeschulen*). The middle schools embraced 218 *Gymnasien* (classical colleges), 3 *Realgymnasien*, 73 *Progymnasien* (preparatory colleges) and Latin schools, and 246 *Realschulen* and *höhere Bürgerschulen*, having together 120,000 pupils. There were nine universities, at Berlin, Königsberg, Halle, Breslau, Greifswald, Marburg, Göttingen, Bonn, and Kiel, with more than 800 teachers and 9,600 students; two Roman Catholic academies; and 128 normal schools, 94 for male and 34 for female teachers. Besides these there are numerous educational institutions for special branches of science, as theological seminaries connected with the universities and at the seats of the Roman Catholic bishops, a philosophical academy at Paderborn, a polytechnic institution and an academy of architecture at Berlin, polytechnic schools at Hanover and Aix-la-Chapelle, mining academies at Berlin and Clausthal, academies of veterinary surgery at Berlin and Hanover, academies of forest culture at Neustadt-Eberswalde and Münden, agricultural colleges at Eldena, Proskau, Poppeisdorf, and Göttingen-Weende, 34 agricultural schools, and a great number of private commercial academies. All educational institutions are controlled, more or less directly, by the government. Even private teachers must submit to a thorough examination before they are permitted to open schools. The common schools are sustained and managed by the municipal corporations, but the teachers are appointed by government. Of charitable institutions, there are 18 deaf-mute asylums, 16 asylums for the blind, several orphan asylums and nurseries, Bible and missionary societies,

&c. The highest branches of scientific culture are fostered by the royal academy of Berlin and numerous associations of scholars. There are large public libraries in all the principal cities; observatories and botanical gardens are connected with the universities; a zoological garden is kept near Berlin. The fine arts are taught by the royal academy of art at Berlin, the art academies of Düsseldorf, Königsberg, Hanau, and Cassel, and five art schools. The number of musical academies and musical societies is enormous. The press of Prussia is treated in the article NEWSPAPERS, vol. xii., p. 338.—The dominant religion in Prussia is the Protestant. The two principal Protestant denominations, the Lutheran and the Reformed or Calvinistic church, united in 1817, assuming the common designation of Evangelical church. According to the census of 1871, there were in Prussia 16,041,215 Evangelical Christians, 8,268,309 Roman Catholics, 325,565 Jews, and 54,903 of smaller religious sects. Included in the latter number were 20,009 Lutheran dissenters, 14,052 Mennonites, 9,375 Baptists, 2,531 Free Religionists, 1,354 German Catholics, and 987 Free Congregationalists. The Old Catholics in 1874 numbered about 18,000. The Evangelical church constitutes a majority in the provinces of Schleswig-Holstein (99 per cent.), Pomerania (97), Brandenburg (95), Saxony (93), Hanover (87), Hesse-Nassau (70), and Prussia (70); the Roman Catholic church in Hohenzollern (96 per cent.), the Rhine province (73), Posen (64), Westphalia (53), and Silesia (51). The Evangelical church is governed by the supreme ecclesiastical council at Berlin (established in 1850) in all spiritual matters, and by the ministry of public worship in temporal affairs. Each province has a consistory and a superintendent general, and is divided into dioceses, at the head of which stand superintendents. The Roman Catholic church has 2 archbishoprics (Gnesen-Posen and Cologne) and 10 bishoprics (Culm, Ermeland, Breslau, Münster, Paderborn, Treves, Osnabrück, Hildesheim, Fulda, and Limburg). Of the Jews fully one half live in the eastern (formerly Polish) provinces. The members of all churches recognized by government enjoy equal civil rights. The Old Catholics have been recognized by the government as a part of the Catholic church, and the bishop elected by them as a bishop of the Catholic church. Other denominations (Baptists, Methodists, German Catholics, and Free Congregationalists) are barely tolerated, though the constitution guarantees full religious liberty.—Prussia is a hereditary constitutional monarchy. The constitution was promulgated Jan. 31, 1850, but has since received various modifications, the last, in reference to the ecclesiastical provisions, in May, 1875. In the territories annexed in 1866, the Prussian constitution was introduced on Oct. 1, 1867. It guarantees to all citizens equality in civil rights, the right of habeas corpus, religious liberty, freedom of

the press, &c. The king is the chief executive, clothed with all prerogatives of monarchical power. He administers the government by the advice of nine responsible ministers, viz.: of the royal household, of foreign affairs, of finances, of public worship, education, and health, of commerce, industry, and public works, of the interior, of justice, of war, and of agriculture. The legislature (*Landtag*) consists of a house of lords (*Herrenhaus*) and a house of deputies (*Abgeordnetenhaus*). The former embraces: 1, all princes of royal blood, including the princes of the formerly sovereign houses of Hohenzollern-Hechingen and Hohenzollern-Sigmaringen; 2, the chiefs of the mediatized princely houses, recognized by the congress of Vienna, to the number of 16 in Prussia; 3, the heads of the territorial nobility, numbering about 50 members; 4, eight titled noblemen, elected in the eight old provinces by the resident landowners; 5, the representatives of the universities, the heads of the chapters, and the burgomasters of towns with more than 50,000 inhabitants; 6, an unlimited number of members appointed by the king for life or for a restricted period. The chamber of deputies consists of 432 members, 352 for the old provinces, and the remainder for the new territories annexed in 1866. The deputies are elected by indirect universal suffrage for a term of three years. The king has an absolute veto power. At the head of the political administration of each of the 11 provinces stands an *Oberpräsident* (chief president). The provinces are divided into administrative districts called *Regierungsbezirke*, except in the province of Hanover, where the former division into *Landdrosteien* is retained. At the head of each *Regierungsbezirk* stands a *Regierungspräsident*, at the head of a *Landdrostei* a *Landdrost*. The number of administrative districts is 34, besides the city of Berlin and Hohenzollern, each of which forms a separate district. The districts are divided into *Kreise* or circles, except Hohenzollern, which is divided into four *Oberamtsbezirke*. At the head of a circle in all the old and some of the new provinces is a *Landrath*; in parts of the new territories, the former titles of the heads of subdivisions, like *Kreishauptmann* and *Amtshauptmann*, have been retained. Provincial assemblies exist, but their powers are only advisory. They cannot originate any measures, and must not even advise the government upon any subject unless called upon to do so. Their principal duty is to apportion the taxes to be levied from the provinces. The police throughout the kingdom is administered by the government. The administration of justice has been completely reorganized since 1848. Publicity of judicial proceedings, trial by jury, and a new criminal code have been introduced, and all exceptional jurisdiction has been abolished. In Rhenish Prussia the *code Napoléon* and the French legal procedure, which were introduced under the rule of Napoleon, have been main-

tained. In the other provinces there are city or district courts, and 26 courts of appeal. The chief tribunal at Berlin is the court of last resort for all parts of the kingdom.—Financially Prussia is in a flourishing condition, and its financial administration is excellent. The annexation of large territories in 1866 and the establishment of the German empire under the Prussian dynasty, in 1871, to whose budget some of the revenues as well as the expenditures of Prussia were transferred, render a comparison of the Prussian budgets of the years before 1867 with those of the following years of little value. The estimates of public revenue and expenditure submitted by the government to the chambers are always prepared to show an even balance; but in recent years the actual revenue has always largely exceeded the estimate, and shown even in years of war a constant and increasing surplus. In the budgets of 1868 to 1874, revenue and expenditures were each estimated at the following amounts: 1868, \$115,000,000; 1869, \$120,600,000; 1870, \$121,200,000; 1871, \$124,500,000; 1872, \$134,600,000; 1873, \$151,200,000; 1874, \$167,500,000. The actual surplus amounted in 1870 to \$6,700,000, in 1871 to \$7,200,000, and in 1872 to \$8,900,000. Of late the income from railways and other state undertakings, such as mines, has been largely increasing, showing a tendency to become in the course of time larger than that from taxation, direct or indirect. In the estimates for 1874, the revenue of the ministry of commerce, chiefly from the railways and mines, was more than two fifths of the entire government receipts. The exemption of a large number of landed proprietors (noblemen) from taxation on real estate was abolished in 1861, but the actual payment of taxes by them did not begin till 1865. The public debt of Prussia, which in 1787 was only \$32,250,000, amounted in 1820 to \$152,491,000. In 1847 it had been reduced to \$98,000,000, but in 1862 it again amounted to \$175,700,000. On the annexation of Schleswig-Holstein, Hanover, Hesse-Cassel, Nassau, and Frankfort to Prussia, it was arranged that the incorporation of the debts of these states with that of Prussia should take place at some future period. This had not yet been done in 1874. The aggregate debt of the entire monarchy in that year amounted to \$259,400,000, of which \$107,900,000 was railway debt. The interest on the latter debt is paid out of the profits of the state lines, the yearly increasing dividends of which likewise create a sinking fund for the gradual extinction of the debt.—The Prussian military system, so elaborate and thorough that it has been chiefly instrumental in giving the state its present leadership among European countries, was in 1871 extended to the whole empire, and the Prussian became a part of the imperial army. The navy of Prussia has in the same way become the chief part of the imperial naval force. (See GERMANY, vol. vii., pp. 750, 751.)

—The country which gave its name to the kingdom of Prussia, of which it is now only a province, was in antiquity probably known to the Phœnicians, who either in their ships or through trading posts procured amber from its Baltic shores. The aborigines, a Lettic tribe kindred to the Lithuanians, appear to have been peaceable and quiet, and acquainted with agriculture. During the first centuries of the Christian era they became dependent upon the Goths, who overran their country. In the 10th century they are first mentioned under the name of Borussi or Porussi. Their religion was polytheism, and human sacrifices were not uncommon. Bishop Adalbert, who attempted to convert them to Christianity, was slain by them while hewing down their sacred oak tree, in A. D. 997. Boleslas I. of Poland invaded their country and compelled them to profess the Christian faith in 1015, but neither he nor his immediate successors could retain a hold upon them. A large army which Boleslas IV. led against them was totally annihilated, and the Prussians even held a part of Poland in subjection for some time. In 1219 they repelled a crusade sent against them from Germany, and soon became the terror of all neighboring countries. The Teutonic knights finally conquered Prussia (1230-'83), founded cities, introduced German colonists and German laws, and by their firm rule made Prussia one of the most flourishing countries of its time. (See TEUTONIC KNIGHTS.) But about the middle of the 15th century the demoralization of the knights, their continual wars with Poland and Lithuania, and their reckless exactions created a powerful opposition. The nobility and the municipalities obtained the assistance of the king of Poland, Casimir IV., and by a war of 12 years' duration (1454-'66) compelled the order to cede western Prussia and Ermeland to Poland. The remainder was left to them as a fief of Poland. In 1511 the margrave Albert of Brandenburg was elected grand master of the order. Having vainly striven to throw off the Polish rule, he turned Protestant, and in 1525 accepted Prussia as a duchy from Poland. His son Albert Frederick becoming insane, the duchy was governed by his relatives, of whom John Sigismund, elector of Brandenburg, inherited it in 1618. He was a descendant of Frederick of Hohenzollern, burgrave of Nuremberg, who had become possessor of Brandenburg in 1415 by foreclosure of mortgage. (See BRANDENBURG, and HOHENZOLLERN.) The electorate of Brandenburg, not Prussia proper, must be considered the nucleus of the present monarchy of that name. The electorate, though frequently divided by the descendants of Frederick, played a conspicuous part in the history of Germany, especially during the reformation. Frederick I. (1415-'40) subdued the robber knights, and obtained some additional territory from Pomerania and Mecklenburg, but succumbed to the Hussites, who

devastated his country with fire and sword in 1432. Frederick II. (1440-'70) enlarged his possessions by purchases from neighboring states, but was unfortunate in his attempts to conquer Lusatia from Bohemia and Stettin from Pomerania. Albert Achilles (1470-'86) and John Cicero (1486-'99) contended energetically against the usurpations of the lords, and promoted industry, commerce, and science. The two younger brothers of the latter received the Franconian possessions of their father, and founded the two branch lines of the house of Brandenburg, Anspach and Baireuth. Joachim I. Nestor (1499-1535) was noted as a scholar, and also as one of the most violent opponents of the reformation, and a persecutor of the Jews, of whom he had many burned at the stake or exiled. Joachim II. Hector (1535-'71) became a Protestant, secularized the bishoprics of Brandenburg, Havelberg, and Lebus, founded many educational or charitable institutions with the proceeds of the church property, and concluded a treaty of mutual inheritance with the duke of Liegnitz in Silesia, which two centuries later became the foundation of the Prussian claims on Silesia. John George I. (1571-'98) expelled the Jews who had been readmitted by his predecessor, but invited the exiled Protestants from the Netherlands into his country, and by wise economy greatly improved the financial condition of his state. Joachim Frederick (1598-1608) acquired by marriage a claim on the duchy of Prussia, which his son John Sigismund (1608-'19) permanently united to the electorate of Brandenburg, having previously, after the death of the duke of Jülich, acquired Cleves and other possessions. Under the reign of George William (1619-'40), Brandenburg and Prussia suffered terribly from the thirty years' war. Having adopted a policy of neutrality, the elector was looked upon as an enemy by both contending parties. Prussia was ravaged by Swedes and Poles, Brandenburg by the imperial armies and those of the league, and during 12 years by the Swedes. From the lowest depth of misery and desolation the country was raised by the energy and wisdom of Frederick William, the Great Elector (1640-'88). By marking out a vigorous and independent policy against France, Sweden, and Poland, and shrewdly taking advantage of dissensions among his enemies, he enlarged his dominions and obtained a position but little below that of the great powers of Europe. Of Prussia he made a sovereign duchy, severing its connection with Poland. At his death his possessions had increased to 42,000 sq. m. with 1,500,000 inhabitants. His son Frederick, the third elector of that name (1688-1713), by consent of the German emperor, assumed the title of king of Prussia, and was crowned as such Jan. 18, 1701. He acquired a few small territories, the principality of Neuchâtel in Switzerland among the rest. His son Frederick William I. (1713-'40) acquired from Sweden a part of Pomerania,

with Stettin, increasing the area of the country to 48,000 sq. m. He left to his son Frederick II., the Great (1740-'86), \$6,000,000 over and above all debts, and an army of 70,000 men, the best disciplined in all Europe. With these means Frederick began a war of conquest, and wrested Silesia from Austria. By a wise and prudent administration he strengthened and consolidated his kingdom, and elevated it to the rank of a great power by successfully resisting during a sanguinary war of seven years' duration (1756-'63) the combined aggressions of Austria, France, and Russia. In 1772 he took part in the first partition of Poland. To his successor he left a treasure of \$50,000,000, an army of 220,000 men, and a territory of 77,000 sq. m. On his accession he had 2,240,000 subjects, and at his death the number exceeded 6,000,000. Frederick William II. (1786-'97), though his reign was weak, harmful, and occupied by imprudent and unsuccessful wars in alliance with Austria against revolutionary France, failed to destroy the prestige of Prussia, and by participating in the second and third partitions of Poland added to his possessions 40,000 sq. m. Frederick William III. (1797-1840), by a weak and vacillating policy, isolated Prussia and encountered the wrath of Napoleon, who, after the ignominious defeat of the Prussian armies at Jena in 1806, reduced the kingdom to less than half its former area. For six years Prussia was cruelly oppressed by Napoleon, who did his utmost to reduce the kingdom to insignificance. But during this period the statesmen of Prussia laid the foundation of its subsequent greatness by unfettering labor and commerce, by granting municipal self-government, and basing the military power of the state upon the people. After the downfall of Napoleon most of its former possessions were restored to Prussia, and in addition to them it acquired parts of the kingdom of Saxony and of Pomerania, Berg, Jülich, and several valuable territories on the Rhine. The promise of a liberal constitution, given by the king to his people, was not kept. The political condition settled down into a sort of patriarchal despotism. The establishment of the Zollverein was the only wise and statesmanlike measure during 25 years of peace. Frederick William IV. (1840-'61), who had great natural talents and scholarship, but was weak and pusillanimous, destroyed almost totally the moral prestige of Prussia, and threw away the opportunity, offered to him by the revolution of 1848, of becoming the head of a united German nation. For nearly 10 years under his reign the reactionary party held almost absolute sway, though the state had been converted into a constitutional monarchy. In 1857 his mental faculties gave way, and his brother William was intrusted with the regency. Frederick William died Jan. 2, 1861, and was succeeded by the regent as William I. The accession of the new king, whose career had already shown him to be heartily devoted

to the long cherished plan of securing complete Prussian leadership in Germany, found the country in the very height of jealous dissensions with Austria, which had become particularly prominent after the peace of Villafranca between Austria and France (1859). The acts which this mutual jealousy inspired, and by which every possible factor was brought into the struggle for control, are described at length in the article GERMANY. For several years there was no open rupture; it was only with the entrance of Bismarck into the Prussian cabinet as minister of foreign affairs, in 1862, and the uncompromising attitude then assumed in certain questions of German politics, that the breach seemed to become irreparable; and no sooner had it been thus widened than the Schleswig-Holstein complication (see AUSTRIA, DENMARK, GERMANY, and SCHLESWIG-HOLSTEIN) arose to present a possible and plausible *casus belli*. In spite of many attempts at mediation, the attitude of the great powers became more and more hostile, and after several arbitrary acts on both sides, the convention of Gastein, which gave the occupation of Holstein to Austria and that of Schleswig to Prussia, but which it seemed evident neither power would long adhere to, placed affairs in precisely the position where another step on either side must mean war. The convention was signed on Aug. 14, 1865; but as early as January, 1866, the conduct of the officials in the duchies gave cause for a new quarrel. In April Prussia made an alliance with Italy, and began to arm. The smaller states of Germany generally sided with Austria. On June 1 Austria arbitrarily took the question of the Danish duchies out of the limits of the Gastein agreement, by suddenly declaring it to be referred to the federal diet; and Prussia, regarding this as a breach of treaty, marched its troops into Holstein, and proposed to restore the joint occupation of both duchies. Austria declared this act to be a violation of the federal constitution, and the federal diet, acting entirely under its leadership, ordered (June 14) the mobilization of all the federal troops except those of Prussia. On June 15 Prussia summoned Hanover, Saxony, and Hesse-Cassel to retract their action at the diet; they refused, and on the next day Prussian troops occupied their territory, and war was begun. The conflict which followed was a remarkable proof of the condition of preparation in which the Prussian state had placed itself; and under the name of the "seven weeks' war" it has become famous as one of the shortest but most decisive struggles in history. On June 22 and 23 the three divisions of the Prussian main army advanced toward the frontiers of Bohemia from two directions—in Silesia under the command of the Prussian crown prince, in Saxony under that of Prince Frederick Charles of Prussia and Gen. Herwarth von Bittenfeld. From the 26th to the 29th various minor engagements took place along the lines, at Podol,

Hühnerwasser, Münchengrätz, Gitschin, Trautenau, Nachod, Königinhof, &c. In the mean while, on the 28th, the Hanoverian army, cut off from reinforcements or means of retreat by the Prussian forces about it, had surrendered at Langensalza. On July 1 the Prussian armies were united near Königrätz; and on the 3d they encountered at Sadowa, near by, the main Austrian army under Benedek, and achieved the decisive victory of the war. (See SADOWA.) The armies of Austria at once retreated to the south, and the northern provinces were left in the power of the enemy. While these things were in progress, a simultaneous campaign was carried on by Prussia in western Germany, but with far less bloodshed; an army under Gen. Vogel von Falkenstein had opposed the Bavarians and the army of the smaller states, forced them to retreat after a battle near Kissingen on July 10, met an Austrian division near Aschaffenburg on the 14th, and entered Frankfurt on the 16th. Another portion of the "army of the Main," under Gen. Manteuffel, met the 7th and 8th corps of the federal army, July 24-27, at Tauberbischofsheim, Helmstadt, and Würzburg, and won minor victories. On the 26th preliminary negotiations for peace were begun at Nikolsburg, and a truce with Austria was declared; this was followed by truces with Bavaria, Hesse-Darmstadt, Würtemberg, and Baden (Aug. 1-3). Definite treaties of peace followed with Würtemberg (Aug. 13), Baden (Aug. 17), Bavaria (Aug. 22), and Austria (the peace of Prague, Aug. 23). The "seven weeks' war," and the treaty which ended it, placed Prussia at the head of Germany, and marked it as one of the first military powers of Europe. The treaty of Prague virtually established a new federation of German states, soon definitely formed (Aug. 18 to Oct. 21) into the "North German Confederation" (*Norddeutscher Bund*), including all the states north of the Main. It shut out Austria from Germany, and left the South German states to take their own course as to the establishment of a *Bund* between themselves. But Prussia gained an aggrandizement of territory as well as of prestige; for it annexed Schleswig-Holstein, Hanover, Hesse-Cassel, Nassau, and Frankfurt, and thus not only extended its boundaries, but removed the principal obstacles to its territorial unity. The chief measures of Prussian politics from the close of the war of 1866 till 1870 are again treated in the article GERMANY. The minor measures of its politics during this period comprised treaties on points of administration, posts, military affairs, &c., with the other states, and regulation of its own educational, industrial, and financial affairs. The part of Prussia in the Franco-German war of 1870-71 (see FRANCE, and GERMANY) is inextricably involved with that of the whole German nation. The conflict served to precipitate the solution of the question which had always been the aim of the king and Bismarck: German unity

under Prussian leadership. On Jan. 18, 1871, King William was crowned at Versailles as emperor of Germany, and on March 21 the first German Reichstag assembled at Berlin. From 1871 to 1874 Prussia had undertaken no important measures independently of the rest of Germany, and its most recent history is therefore contained in the article on the empire. (See also WILLIAM I., of Prussia and Germany, and for fuller accounts on previous periods of Prussian history the notices on the principal monarchs under the head of FREDERICK.)

PRUSSIAN BLUE. See POTASSIUM.

PRUSSIA PROPER, a great division of the Prussian kingdom, comprising East or Ducal Prussia, and West or Royal Prussia, now officially united into one province; area, 24,114 sq. m.; pop. in 1871, 3,137,545. East Prussia is bounded N. E., E., and S. by Russia (Courland, Lithuania, and Poland), W. by West Prussia, and N. W. by the Baltic. Its surface is low and almost uniformly level, and there are numerous lakes formed by the rivers, the fall being insufficient to carry their waters to the ocean. The most important streams are the Memel or Niemen, which empties into a vast estuary or lagoon called the Kurisches Haff, the Pregel, and the Passarge. The greater part of the soil is fertile, and the principal crop is potatoes. Nearly one third of the land is covered with forests. Fruit, flax, hemp, tobacco, grain, live stock, and fowls are largely produced, game is abundant, and amber is found in considerable quantities. East Prussia comprises the administrative districts of Königsberg and Gumbinnen. Most of the inhabitants are Germans.—West Prussia is bounded N. by the Baltic, E. by East Prussia, S. by Russian Poland and Posen, and W. by Brandenburg and Pomerania. The surface, soil, and productions are like those of East Prussia. The principal rivers are the Vistula, whose E. mouth, the Nogat, enters the Frisches Haff, the Drewenz, and the Brahe. There are numerous inland lakes, but they are not so large as those of East Prussia. This division comprises the administrative districts of Dantzic and Marienwerder. About 67 per cent. of the inhabitants are Germans, and 33 per cent. Poles.—Prussia proper was conquered and Christianized in the 13th century by the Teutonic knights. In 1466 they were forced by Casimir IV. to cede West Prussia to Poland, while keeping East Prussia as a fief of that kingdom. The latter division, when converted into a duchy by the last grand master of the order, Albert of Brandenburg (1511), was designated as Ducal Prussia, and was united with Brandenburg by the elector John Sigismund (1618). Western or Royal Prussia was severed from Poland, in the first partition of that kingdom (1772), by Frederick the Great, with the exception of the cities of Dantzic and Thorn, which Frederick William II. received in the second partition (1793).

PRUSSIC ACID. See HYDROCYANIC ACID.

PRUTH (anc. *Poras*), a river of Europe, which rises in the N. E. Carpathians, on the boundary between the Hungarian county of Mármaros and Galicia, flows E. through the latter country and Bukowina, and S. S. E. along the boundary line of Roumania and Bessarabia, and joins the Danube at Reni, near the delta of the latter river. The length of its course is about 350 m. The Pruth figures conspicuously in the history of every Turko-Russian war since the times of Peter the Great, who in 1711 narrowly escaped being captured on its banks, with his army.

PRYNNE, William, an English political writer, born at Swainswick, near Bath, in 1600, died in London, Oct. 24, 1669. He graduated at Oriel college, Oxford, in 1620, studied law, and was admitted a barrister of Lincoln's Inn. Having become a Puritan, he published pamphlets against Arminianism; and some passages in one entitled "*Histriomastix, the Player's Scourge*" (1632), appearing to reflect upon the king and queen, Bishop Laud brought him before the star chamber, and by that court he was excluded from Lincoln's Inn, and condemned to pay a fine of £5,000, to have his ears cut off, to stand in the pillory at Westminster and Cheapside, and to be imprisoned during the king's pleasure. His work was also ordered to be burned before his eyes by the common hangman. This sentence was rigorously carried out, but from his prison he continued to issue tracts against the prelates. The publication of one of these, in 1637, entitled "*News from Ipswich*," stirred up anew the anger of Laud, and Prynne was again summoned before the star chamber, and fined £5,000. The remains of his ears were cut off, and the letters S. L. (seditious libeller) were branded on both cheeks. At the execution of this sentence in the palace yard, and afterward on his way to his prison, Carnarvon castle, a great crowd was present, which manifested its sympathy and respect for the sufferer. Such numbers also visited the castle, that after a residence of ten weeks he was removed by an illegal order to the castle of Mont Orgueil in the island of Jersey. On Nov. 7, 1640, he was released by an order of the house of commons, his sentence being reversed, and damages to the amount of £5,000 being awarded him against his judges. His entrance into London had the appearance of a triumphal procession. Soon after he became a member of parliament for Newport in Cornwall, and in 1647 he was elected recorder of Bath. He took a prominent part in the proceedings of the long parliament, zealously espousing the cause of the Presbyterians and opposing the Independents. Just before the king's trial he was ordered into the custody of the sergeant at arms for "denying the supremacy of parliament," and on Dec. 6, 1648, he was arrested by the army and ejected from the house. He now became a bitter opponent of Cromwell, and published articles of so virulent a character that he was twice imprisoned. He

was discharged from his office of recorder of Bath in 1654, but was reelected after the restoration. He was one of the excluded members who sat in the house of commons early in 1660, and was zealous in furthering the restoration, after which he was appointed keeper of records in the tower. Wood, in his *Athenæ Oxonienses*, gives a catalogue of his writings, which comprises nearly 200 volumes. The most valuable are his "Collection of Records," "Calendar of Parliamentary Writs," and "Observations on the Fourth Part of Coke's Institutes." His "Records" he intended to bring down as late as the reign of Elizabeth, but he lived only long enough to complete the work as far as that of Henry III.

PRZEMYSŁ, a town of Austrian Galicia, on the San, at the junction of the Lemberg and Cracow and the Hungaro-Galician railways, 55 m. W. of Lemberg; pop. in 1870, 15,184 (against 9,800 in 1857), including more than 5,000 Jews. It is one of the oldest towns of Poland. It has many Gothic churches, including two ancient cathedrals, is the seat of a Catholic and a Greek United bishop, and has a gymnasium and other schools. The principal trade is in timber, leather, and linens.

PSALMANAZAR, *George*, the assumed name of a French impostor, born about 1679, died in London in 1753 or 1763. He travelled over various parts of France, Germany, and the Netherlands; was a soldier, a beggar, and a servant, pretending at first to be a Japanese and afterward a Formosan; and at length went to England with one Innes, a chaplain in a Scotch regiment, who claimed the credit of converting him to Christianity. In 1704 he published at London a pretended "History and Description of the Island of Formosa off the Coast of China," in which the description of the island was given with such apparent fidelity, the manners and customs were illustrated with so many engravings, and such copious specimens were given of a new language, that the belief in the story was general until the author revealed the imposition. He now applied himself seriously to study, and wrote a large portion of the "Universal History," a true account as far as known of Formosa for the "Complete System of Geography," an "Essay on Miracles," and a version of the Psalms. He left in manuscript his own memoirs, published in London in 1765.

PSALMS, *Book of* (in the Septuagint, *Ψαλμοί*, hymns sung to the accompaniment of stringed instruments; in Hebrew collections, *Tehillim*, praise songs), one of the canonical books of the Old Testament, containing a copious collection of religious songs. Religious poetry among the Hebrews, as among the oriental nations in general, can be traced to a high antiquity. The Pentateuch contains several hymns and fragments of hymns; in the book of Psalms we find one psalm which is ascribed to Moses; and in the time of the judges we meet with the beautiful song of Deborah

(Judges v.). But the religious poetry of the Hebrews attained its principal development through King David, who is represented in the Scriptures as having practised it from early youth until his death, and in particular as having introduced the singing of hymns into the service in the tabernacle. In the Hebrew original 73 psalms are ascribed to David, but none of the old ecclesiastical translations, as the Septuagint, the Vulgate, and the Peshito, agree in this respect. Besides Moses and David, several other authors of psalms are named in the headings; thus, 2 psalms are ascribed to Solomon, 12 to Asaph, 11 to the sons of Korah, a Levitic family, and one each to Heman and Ethan. The Alexandrine and Syriac versions mention also the prophets Haggai and Zechariah as the authors of some psalms.—The collection of psalms, in the form in which it appears in the Old Testament, cannot have been completed until after the captivity, as some of the psalms are obviously of subsequent origin. According to Hitzig, Lengerke, and Olshausen, some of the psalms belong to a time as late as that of the Maccabees. The possibility of Maccabean psalms is admitted by Delitzsch, while their existence is denied by Hengstenberg, Hävernick, Keil, Ewald, and others. Particular collections, which were afterward embodied in the book of Psalms, may possibly have existed as early as the time of David. The book of Psalms is, according to the analogy of the Pentateuch, divided into five books, each of which closes with a doxology. The second book has a postscript, which seems to have been the conclusion of an old particular collection. The Septuagint and the Vulgate, which follows it, differ somewhat from the Hebrew in numbering the psalms, the difference beginning with the 10th and extending to the 147th; the entire number in all these is 150.—The contents of the book of Psalms are manifold. With regard to their object, they may be divided into six classes: 1, hymns to God, in which he is praised as the creator, preserver, and governor of the world, and in particular as the protector of his chosen people; 2, national psalms, in which the people are reminded of the ancient history of Israel from the time of the patriarchs, especially of the history of Moses, of the many favors received from God, of the occupation of the promised land, of the signal assistance of God, and of the gratitude therefore due to him; 3, the king's psalms, in which the theocratic king is praised as the representative of Jehovah, and the assistance of the Lord is invoked for him; 4, moral hymns, in which the fate of the pious and the wicked is described; 5, the psalms of lamentation, in which, sometimes by individuals, sometimes by the entire people, misery and calamity, especially oppression experienced from foreign or domestic foes, are lamented, with a prayer to God for deliverance; a subdivision of this class is the penitential psalms, describing the sufferings

of the psalmist as deserved, recognizing the committed sin, and praying for pardon; 6, prophetic psalms, which have reference to a Messianic future. A great difference of opinion prevails among exegetical writers as to the number of psalms belonging to this last class, and theologians of the rationalistic school have maintained that a directly predictive character cannot be claimed for a single passage in the Psalms.—The collection of psalms seems to have come at once into public use at divine service both as prayers and hymns. The singers who were appointed by David for the service of the sanctuary sang psalms. In the time of Hezekiah, psalms of David and Asaph are recorded as having been sung at religious solemnities (2 Chron. xxix. 30), and songs of David were also sung in the second temple, after the captivity (Ezra iii. 10). In the Christian church the book of Psalms had likewise from the beginning a great importance. Christ himself, after the celebration of the last supper, sang psalms with his disciples; and soon afterward, when on the cross, he used the words of a psalm. Paul and Silas praised God in psalms in the dungeon at Philippi, and Paul exhorts the Ephesians and Philippians to praise the Lord with psalms and spiritual songs. The early Christians used the psalms both in public service and in their private devotions, and the church soon made them a prominent part of the liturgical books, in particular of the breviary. In the Protestant churches the psalms have always been extensively used for congregational singing, and some denominations, as the Reformed Presbyterian church, do not allow in divine service the use of any other religious hymns.—On account of the significance which has always been attached to the book of Psalms, it has in modern times called forth a larger number of commentaries than any other Biblical book. Le Long, in his *Bibliotheca Sacra* (Paris, 1723), enumerates more than 500 commentaries, exclusive of those which form parts of larger works, as well as of the commentaries on a part of the book of Psalms. Among the English commentaries the work of Bishop Horne has not been superseded for popular use, though its critical value is small. Of more critical worth are: Phillips, "The Psalms in Hebrew, with a Critical, Exegetical, and Philological Commentary" (2 vols., London, 1846); and Browne, "The Book of Psalms, a new Translation, with Introduction and Notes Explanatory and Critical" (2 vols., 2d ed., London, 1870). The exegetical literature of Germany is rich in excellent commentaries, of which the best known are those by De Wette, Hitzig, Hirzel, Ewald, Hengstenberg, Delitzsch (new ed., 1867), Hupfeld (4 vols., 1855-'61; new ed. by Riehm, 1867-'71), and Moll, *Der Psalter* (in Lange's *Bibelwerk*, 1869-'70). In America new translations have been published by G. R. Noyes, "A new Translation of the Book of Psalms, with an Introduction" (3d ed., 1867); J. A. Alexander,

"The Psalms Translated and Explained" (3 vols., 1850); and T. J. Conant, "A new Version of the Psalms, and Philological Notes" (in the American ed. of Lange's *Bibelwerk*, 1872).

PSALTERY (Gr. *ψαλτήριον*), a stringed musical instrument in use among the ancient Jews, and supposed to have been identical with the *nebel* mentioned in the Psalms. Burney says it resembled partly the lyre and partly the harp, but according to others it was in shape a trapezium, not unlike the dulcimer. (See DULCIMER.)

PSAMMENITUS (PSAMMETIK III.), the last king of Egypt of the 26th dynasty, succeeded his father Amasis in 526 B. C. He had scarcely begun his reign when Egypt was invaded by Cambyses, king of Persia, who defeated him near Pelusium, shut him up in Memphis, and soon forced him to surrender (525). He was at first spared, but, being suspected of treasonable designs, was condemned to put an end to his life.

PSAMMETICHUS. See EGYPT, vol. vi., p. 463.

PSKOV, or **Pleskov.** I. A W. government of European Russia, bordering on St. Petersburg, Novgorod, Tver, Smolensk, Vitebsk, and Livonia; area, inclusive of lakes, 17,067 sq. m.; pop. in 1870, 775,701. The Valdai hills traverse the S. E. part, but the surface is generally level. There are several lakes, the most important of which, Lake Pskov, forming the southern part of Lake Peipus, comes within the limits of the province on the N. W. frontier; and in the southeast there are numerous marshes. A great part of the country is covered with forests of pine, which yield large quantities of pitch. The principal crops are rye, oats, barley, and pulse. Hemp and flax are cultivated. The only important manufacture is leather, and the inhabitants excel in dressing skins. The population is chiefly of Russian origin, but there are a few of other races, including some Mohammedans. II. A city, capital of the government, situated on the left bank of the Velikaya, about 5 m. from its mouth in Lake Pskov, and on the St. Petersburg and Warsaw railway, 165 m. S. S. W. of St. Petersburg; pop. in 1867, 12,981. It is enclosed by a wall 5 m. in circuit, and the Kremlin, or citadel, stands in the centre. It is the seat of a Greek archbishop, whose diocese embraces also the governments of Livonia and Courland, and has a cathedral and about 30 other churches, several of which are in a ruinous condition, three convents, several schools, and some charitable institutions. There are many tanneries, and a brisk trade is carried on in lumber, hemp and flax. Pskov is very conspicuous in the early history of Russia. It has been often besieged; in 1614 Gustavus Adolphus was obliged to retire from before its walls.

PSYCHE (Gr. *ψυχή*, breath, or the soul), a character of Greek romance, generally accepted as a personification of the human soul. A certain king, says Apuleius, had three daughters,

of whom the youngest, named Psyche, was a marvel of beauty, and altars were consecrated to her that properly belonged to Venus. The anger of that goddess was excited, and she commanded her son Cupid to inspire Psyche with a passion for some frightful monster; but he himself fell in love with her, and bore her away to a delightful place, where she was visited every night by the young god, who left her at dawn. Her sisters persuaded her that he who came to her every night, and whom she had never seen, must be a loathsome creature, and urged her to destroy him while he slept; but when she brought a lamp and beheld his beauty, her joy deprived her of the power of motion, and while she stood a drop of hot oil falling from her lamp upon his shoulder awoke him. With a few words of reproach he fled. Psyche now endeavored to destroy herself, but nothing in nature would injure her. At length she came to the temple of Venus, who made her a slave. Cupid finally delivered her, and, being now sufficiently purified through suffering, she was united to her beloved by Jupiter himself. In works of art Psyche is represented with the wings of a butterfly.

PSYCHOLOGY. See PHILOSOPHY.

PTAH, or *Phthah*, one of the principal divinities of ancient Egypt. He was believed to be the author of everything visible, the father of the god of the sun, and the ruler of light and fire. His seat of adoration was at Memphis, and his temple, said to have been founded by Menes, was one of the largest and most magnificent in Lower Egypt. At Hermopolis Magna were worshipped eight children of Ptah, representing the elements, and the immediate rulers of the world. Ptah's symbol was the *scarabæus sacer*, which insect was supposed to multiply without bearing, and many monuments depict Ptah with this animal instead of a head upon the shoulders. He is sometimes represented in the diminutive form of a child or a dwarf, presumably as suggestive of his being the god of the beginning, and occasionally also in the swaddlings of a mummy, which was probably intended to suggest his attribute of immutability. The Greeks compared him to their god Hephestus. (See **VULCAN**.)

PTARMIGAN, the popular name of the gallinaceous birds of the grouse family embraced in the genus *lagopus* (Briss.), which differ from the ordinary grouse in having the legs feathered to the claws, giving somewhat the appearance of a hare's foot (whence the generic name, Gr. *λαγός*, a hare, and *πους*, foot), in the truncated tail about two thirds as long as the wings and of 16 to 18 feathers, in most of the species becoming white in winter, and in the nasal groove being densely clothed with feathers; the family characters have been given under **GROUSE**. There are six or eight species described, inhabiting the northern and snow-covered regions of both hemispheres, being one of the few genera characteristic of the arctic fauna; they are as much at home in snow as

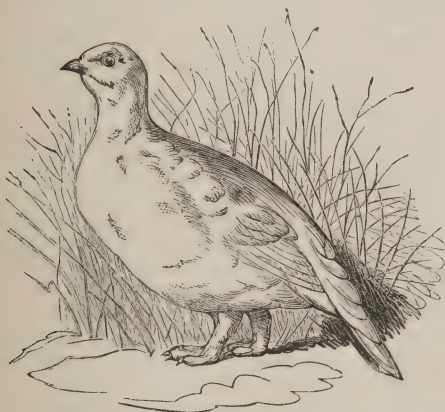
are the web-footed birds in water, and their plumed feet enable them to run over its surface without sinking. They live in families during most of the year, and are monogamous; the females incubate, but the males assist in rearing and feeding the young; the males have a loud harsh cry, and the females cackle like a hen. They are rapid fliers, without making a whirring noise, and swift runners; they feed upon berries, buds, mosses and lichens, and even insects; their flesh is good, and their pursuit affords an exciting sport; they are very shy, but when started are easily shot on account of their regular flight. The summer plumage is varied with brown, black, and gray, most of the wing remaining white; in the males the mottling is finer and the colors brighter. It is very difficult to ascertain the exact number of species, from the rarity of specimens in summer plumage, and the absence of accurate determination of sex.—There are three well ascertained species in America. The white ptarmigan or willow grouse (*L. albus*, Aud.) is



Willow Grouse (*Lagopus albus*).

about 15½ in. long and 24½ in. in alar extent; the bill is black, very stout and convex, and broad at tip; the general plumage in summer is rufous or orange chestnut on the head and neck; feathers of back black, closely barred with yellowish brown and chestnut; most of wings and lower parts white; tail brownish black; in winter white, with black tail; no black stripes through the eye. It occurs in the northern parts of America, and is common in eastern Labrador, Newfoundland, and the Northwest territories, and in rare instances in the northern United States; it is found in open rocky grounds and among dwarf willows and birches. In winter they scratch in the snow down to the mosses and lichens on which they feed, collecting often in considerable flocks. In winter the flesh is dry, but is tender and has an agreeable aromatic flavor in summer. They breed in Labrador about the beginning of June, placing the nest under the creeping branches of low firs; the eggs are from 6 to 14, of a fawn color or rufous ground with irregular

spots of reddish brown; only one brood is raised in a season. The rock ptarmigan (*L. rupes-tris*, Leach) is 14½ in. long; the bill is slender, rather compressed at tip; in summer the feathers of the back are black banded with yellowish brown and tipped with white; in winter white, with the tail black (the four middle feathers white), and the male with a black bar from the bill through the eyes. It occurs in arctic America, rarely coming further south than lat. 63° N. in the interior, but to 58° on Hudson bay, and in the Rocky mountains, according to Richardson, to 55°; the same species is said to occur in the northern parts of the eastern hemisphere; the eggs are pale reddish brown, with darker spots, and are 1½ by 1¼ in. The white-tailed ptarmigan (*L. leucurus*, Swains.) has a slender bill, the plumage in summer blackish brown barred with brownish yellow, and in winter entirely white; it is 13 in. long and 21 in alar extent; it is found in the N. W. portions of America, and to the south along the Rocky mountains to lat. 39°.



European Ptarmigan (*Lagopus mutus*)—winter plumage.

—The common European ptarmigan (*L. mutus*, Leach) is about 15 in. long; the bill is black, short, and robust; the summer plumage is ashy brown mottled with darker spots and barred with orange yellow and dark brown on the sides of the neck and back, and the tail, with the exception of the two middle feathers, grayish white with a narrow terminal white band. It is fond of lofty and northern regions, going as far as Greenland and coming down to the highlands of Scotland; when pursued, like the other species, it is apt to dive under the soft snow; it sometimes does this for protection from the cold, and in damp weather is sometimes imprisoned and destroyed under the frozen surface of the snow; the ruffed grouse has the same habit. A species much resembling this, if not identical with it, occurs in America, in the neighborhood of Baffin bay, and has been described by Audubon as *L. Americanus*.—The Scotch ptarmigan or moorcock (*L. Scoticus*, Steph.) seems pecu-

liar to Great Britain, and is abundant in the hilly districts of Scotland; the general color is chestnut brown, with black spots on the back and undulating black lines below; the winter plumage is the same. It is highly esteemed as game; where not much pursued it is not very shy, but its plumage is so like the surrounding dark moss and heaths, that it can hardly be discovered without the aid of a pointer; it feeds upon heath tops and mountain berries.

PTERICHTHYS. See GANOIDS.

PTERODACTYL (*pterodactylus*, Cuv.; Gr. πτέρων, wing, and δάκτυλος, finger), a genus of fossil flying reptiles, possessing essentially the characters of saurians, with some only apparent relations to bats and birds. They have been divided into three genera according to the number of joints in the wing-bearing finger and the disposition of the teeth; all are characteristic of the secondary epoch, being found principally in the lithographic schists of Solenhofen, and in the oölite, lias, wealden, and chalk of Europe and the United States. In the genus *pterodactylus* the jaws had teeth even to the extremity; the skull was elongated, with the intermaxillaries large; nasal opening wide and near the middle of the muzzle, partly closed in front by a small bone as in the monitors, and with a surrounding circle of small bones and a small opening into the orbit as in birds; the lower jaw, as in crocodiles, had no coronary process, and was articulated behind the eyes; the teeth, 5 to 17 on each side, were conical, slightly arched, compressed, inserted in separate cavities, and hollowed at the base; neck of 7 stout vertebræ; dorsals 13 to 15, and, with the ribs, weak; lumbar 2 or 3, sacral 6, anchylosed together, and caudal 10 to 15; the shoulder blade and coracoid bone separate and weak; scapular arch and pelvis as in lizards, except that



Pterodactyl.

the last seems to have had marsupial bones, according to Pictet; the long bones hollow and with air openings, as in birds; humerus

short and stout, and forearm twice as long; hind limbs slender, with 5 moderate toes of the same length; 5 or 6 bones in the wrist, 5 metacarpals, 5 fingers, with respectively 1, 2, 3, 4, and 4 joints; the first 4 short and with hooked nails, the external very long, equal to the neck and body, and nailless; the gape of mouth very large. This singular animal was referred to the swimming birds by Blumenbach and to the bats by Sömmering, and was determined to be a reptile by Cuvier. The nearly equal and conical teeth, very small cranial cavity, different number of joints in the fingers, and reptilian shape of sternum and scapula show that it was not a bat-like mammal; the existence of teeth, the small number of the vertebræ in the neck, the thinness of the ribs and tail and the absence of recurrent processes in the latter, the form of the sternum and number of the fingers, prove that it was not a bird. These characters place it among reptiles, but it had also a modification of the anterior extremities in the form of wings, which are not possessed by any existing or any other fossil members of the class, the so-called wings of the dragon being merely membranous expansions from the sides of the body supported by the ribs. The form of the wings is also remarkable and unique; in birds the fingers are very little separated, and serve as a basis for the plumes; in bats the flying membrane is stretched upon the four elongated fingers, the thumb remaining rudimentary; but in the pterodactyl the external finger alone is greatly developed and supports the flying membrane, the other four having the usual short dimensions; the membrane extended probably from the long finger along the sides of the body to the hind limbs and beyond, including the tail. About 20 species are described, varying in alar extent from a few inches to four or five yards; they probably flew and crept about in the manner of bats; the form of the teeth and strength of the jaws indicate a carnivorous animal, but of feeble powers; the smaller species must have been insectivorous, and the largest may have seized fish or small reptiles of their own or other genera. The great size of the eyes indicates nocturnal habits; the posterior limbs were so far developed that they could doubtless assume an erect position like birds, and perch on trees; the claws of the fore and hind feet would also enable them to climb along the rocks; the body was probably scaly, as in lizards. From the weakness of the scapular arch some have doubted the power of active flight in the pterodactyl, believing that the wing membranes could only support it in the air when leaping, in a little more perfect manner than in the dragons; but it must be remembered that the atmosphere of the secondary geological age was much more dense than the present, requiring proportionally less muscular force for aerial locomotion. The most anciently known species is the *P. longi-*

rostris (Oken), about the size of a woodcock, with a length of 10 in. and an alar extent of 21 in.; the teeth were $\frac{1}{4}$ on each side. The *P. brevisrostris* (Cuv.) had a shorter muzzle, the head resembling more that of a goose just hatched than of a reptile; the teeth were very small, $\frac{1}{8}$; the total length was less than 3 in., and there were only four posterior toes. Other species were less than 2 in. long, while on the contrary the *P. ornis* (Giebel) of the wealden was 2 ft. in length; in the chalk of Maidstone, England, Mr. Bowerbank detected bones of a species which he named *P. giganteus*, 6 to 7 ft. in alar extent; the *P. Cuvieri* (Bowerb.) is believed to have spread $16\frac{1}{2}$ ft. In 1871 Prof. Marsh found in the upper cretaceous rocks of western Kansas a species with an expanse of wing of 20 ft., which he named *P. Owenii*. Since 1869 Prof. Marsh has discovered the remains of three different species in the same regions.—The genus *rhamphorhynchus* (H. von Meyer) or *ornithocephalus* (Sömm.) was separated for a few species of the Jurassic age, having the anterior portion of the jaws without teeth, and probably with a horny beak; the scapula and coracoid were consolidated together, and the tail long and stiff, with about 30 vertebræ; there were four joints in the wing finger; the largest species was about 18 in. long. The genus *ornithopterus* (H. von Meyer) had only two joints in the wing finger.

PTEROPODS. See MOLLUSCA.

PTOLEMAIS. See ACRE.

PTOLEMY (Gr. Πτολεμαῖος), the name of 13 Greek kings of Egypt, of whom the first three were the most important, and are treated in separate articles. Ptolemy IV., Philopator (222–205 B. C.), son of Ptolemy III., was mainly distinguished for cruelty and debauchery. The reign of Ptolemy V., Epiphanes, his son (205–181), was marked by the rapid decline of the Egyptian monarchy. His son Ptolemy VI., Philometor (181–146), by Cleopatra, daughter of Antiochus the Great of Syria, was aided in his wars with Syria, where he was some time a captive, by the Romans. Ptolemy VII., Physcon (the Fat, his usual cognomen, but called by himself Euergetes II., 146–117), brother of the last, with whom he reigned jointly for a time, and whose son he murdered, was driven to Cyprus by a rebellion of the Alexandrians on account of his cruelty, and afterward restored. He married his sister Cleopatra II., and afterward his niece Cleopatra III., and was a patron of letters and himself an author. Ptolemy VIII., Lathyrus, ruled in conjunction with his mother Cleopatra III. at intervals from 117 to 81, and married his sister Cleopatra IV. During his reign Thebes, having revolted, was destroyed. Ptolemy IX. (Alexander I.), brother of the last, ruled for a while in conjunction with his mother. His wife was his sister Berenice III. Ptolemy X. (Alexander II.), step-son and husband of Berenice III., whom in 81 he put to death, was himself expelled and slain after a reign of 19 days. With him

expired the legitimate line of the Ptolemies. Ptolemy XI., Nothus or the Bastard, also called Auletes or the Flute Player (80-51), an illegitimate son of Lathyrus, was one of the worst of the Ptolemies, and his reign was marked by complications with the Romans, whom he courted. He was expelled in 58, and restored in 55 by A. Gabinus, proconsul in Syria, for a bribe of 10,000 talents. Ptolemy XII. (51-48), his son, ruled in conjunction with his sister Cleopatra VI., whom he expelled in 49; for this the Romans made war, and he was lost in attempting to escape. Ptolemy XIII., Puer, younger brother of the last, married his sister, widow of Ptolemy XII., and was poisoned by her in 48. With him closes the line, although some reckon Cæsarion, the son of Cleopatra by Cæsar, as Ptolemy XIV. (See CLEOPATRA.)

PTOLEMY I., surnamed **SOTER**, son of Lagus, and founder of the Græco-Egyptian dynasty, born near the court of Philip of Macedon in 367 B. C., died in Alexandria in 283. His mother Arsinoë had been a concubine of Philip, and many therefore supposed him to be his son. He was one of the principal generals of Alexander the Great in his Asiatic campaigns. After the death of Alexander in 323, he became governor of Egypt during the nominal reigns of Philip Arrhidæus and Alexander IV., and the regency of Perdiccas. One of his first acts was to put to death Cleomenes, who as receiver general of tributes had amassed an enormous fortune, and was a partisan of Perdiccas. In 322 he annexed the city and province of Cyrene. To oppose Perdiccas, he leagued in 321 with Antigonus, Antipater, and Craterus. Perdiccas invaded Egypt, but Ptolemy defeated him and prevented him from crossing the Nile. Subsequently, when Perdiccas was murdered by his own soldiers, Ptolemy sent wine and provisions to the invading army, and so won them that they offered him the regency, which he declined. In 320 he seized upon Phœnicia and Cœle-Syria, and it was probably during this expedition that he took possession of Jerusalem without opposition by attacking it on the sabbath. To resist Antigonus, he formed a coalition in 316 with Seleucus, Cassander, and Lysimachus; and after a struggle of four years, during which he lost Phœnicia, peace was concluded (311). In 310 Ptolemy renewed hostilities under the pretext that Antigonus had violated the treaty by keeping his garrisons in the Greek cities of Asia Minor and the adjacent islands, and in the long war which followed he lost Cyprus by his defeat in the sea fight near Salamis in 306. Antigonus assumed the title of king, and Ptolemy followed his example. Demetrius, the son of Antigonus and conqueror of Salamis, now invaded Egypt, but, baffled at the banks of the Nile, turned his arms against Rhodes, which had refused to join in the attack. Ptolemy enabled it to hold out by furnishing troops and provisions, and out of gratitude the Rhodians gave him the title of saviour (Soter). The death of Antigonus at

the battle of Ipsus in 301 terminated the war, and added Syria and Palestine to Ptolemy's dominions; and in 295 Cyprus was recovered. In 287 he was in league with Seleucus and Lysimachus against Demetrius, but the rest of his reign was peaceful. He made Memphis his capital, took measures to promote the happiness of his Egyptian subjects, revived their ancient religious and political constitution, and restored to the priestly caste some of its former privileges. He showed equal toleration to the Jews and the Greeks, and great numbers of both, among them scholars of the greatest renown, were attracted to Alexandria. He laid the foundation of literary institutions, the most celebrated of which were a library and a museum, a kind of university whose professors and teachers were supported at the public expense. Ptolemy wrote a history of the wars of Alexander. He wished his youngest son Ptolemy Philadelphus, the offspring of his favorite wife Berenice, to succeed him, to the exclusion of his elder son by his former wife Eurydice, and effected his purpose by abdicating in his favor in 285, continuing however to exercise sovereignty until his death.

PTOLEMY II., surnamed **PHILADELPHUS**, king of Egypt, youngest son of the preceding by Berenice, born in the island of Cos in 309 B. C., died in Alexandria in 247. He was carefully educated, and was thoroughly imbued with his father's policy. He cleared Upper Egypt of robbers, penetrated Ethiopia, establishing traffic with the tribes, and opened southern Africa to the Alexandrian merchants. To command the Red sea, he founded Arsinoë (near Suez), and connected it with Alexandria by restoring and completing the canal begun by Necho. He constructed the ports of Myos-Hormos and Berenice, and connected the latter with Coptos on the Nile by a road 258 m. long across the desert. The museum founded by his father was improved by the addition of botanical and zoological gardens, works of art were collected from Greece, and large additions were made to the library. (See ALEXANDRIAN LIBRARY.) He spent vast sums on public works, built the celebrated lighthouse on the island of Pharos, and erected a magnificent royal mausoleum, to which he removed the remains of Alexander the Great from Memphis. The most distinguished poets, philosophers, mathematicians, and astronomers resided at his capital. For the use of the Alexandrian Jews, the Septuagint version of the Hebrew Scriptures is said to have been made by his command. His reign was disturbed by the revolt of his half brother Magas, viceroy of Cyrene, who succeeded in maintaining his independence; and by a contest with Syria for the possession of Phœnicia and Cœle-Syria, which was kept up at intervals till near the close of his life, when these provinces at last remained in his possession. He took part several times in the affairs of Greece, maintaining an unfriendly attitude toward Macedon, and established relations of

amity with the rising republic of Rome. He founded a gymnasium at Athens, and planted numerous colonies in various parts of his foreign dominions, which comprised Phœnicia, Cœle-Syria, Palestine, Cyprus, the Cyclades, and portions of southern Asia Minor, Ethiopia, Arabia, and Libya. The effeminacy of his court increasing with the wealth of the country, he came at length to lead the indolent life of a refined voluptuary. Repudiating his first wife, Arsinoë, daughter of Lysimachus, he married his own sister Arsinoë, widow of Lysimachus, which the Egyptian law allowed, but she brought him no children. Another stain on his memory is the execution of two of his brothers, for which his surname, which he himself had assumed to signalize his attachment to his sister, became a subject of derision.

PTOLEMY III., surnamed **EVERGETES**, eldest son and successor of the preceding, by Arsinoë, daughter of Lysimachus, died in 222 B. C. On coming to the throne he found in the public treasury an immense amount of money, and at his command a vast army and navy. His warlike ardor was roused by the ill treatment and subsequent murder of his sister Berenice, wife of Antiochus Theos, king of Syria. With a large army he ravaged Syria and its eastern provinces, advancing as far as Susa, and, without establishing his authority in any new possessions, brought back immense booty in gold and silver, and the Egyptian idols which Cambyses had carried off to Persia. For this the Egyptians called him *Euergetes* (benefactor). In right of his wife Berenice, daughter of Magas, Cyrene was united to his dominions, and he made large acquisitions of territory in Arabia and Abyssinia. He inherited the religious liberality and love of learning of his progenitors, and was like them a proficient in letters.

PTOLEMY, Claudius, a Helleno-Egyptian mathematician, astronomer, and geographer, said to have been born in Pelusium, flourished at Alexandria in the 2d century A. D. Scarcely any particulars of his life are known. His *Μεγάλη Σύνταξις της Ἀστρονομίας*, or "Great Astronomical Construction," contains nearly all that is known of the astronomical observations and theories of the ancients, and is generally cited under the Latin titles *Syntaxis Mathematica* and *Constructio Mathematica*. The most important part of this work is a catalogue of stars, deduced from that constructed by Hipparchus. (See **PRECESSION**.) The *Syntaxis* treats of the relations of the earth and heavens; the effect of position upon the earth; the theory of the sun and moon, without which that of the stars cannot be undertaken; the sphere of the fixed stars; and the determination of the planetary orbits. He places the earth in the centre of the universe, and the Ptolemaic system, based on the theories of Hipparchus, was universally received till the time of Copernicus. During all that interval the history of astronomy presents scarcely anything more than comments on

Ptolemy's writings. But for the Arabians the *Syntaxis* would probably have perished. It was translated by them in the reign of the caliph Al-Mamoun, son of Haroun al-Rashid (about 827), and handed down under the title of *Almagest*. Translations from the Arabic were made into Latin, but the Greek text was subsequently also discovered in Byzantine manuscripts. Ptolemy left a copious account of the manner in which Hipparchus established his theories, and in most of the branches of the subject gave additional exactness to what that astronomer had done. He computed, notwithstanding the fundamental errors and the inaccuracies of his system, the eclipses of the next six centuries; determined the planetary orbits; and is commonly said to have discovered the moon's second inequality or evection, though it is probable that Hipparchus really detected this inequality. Three observations cited by Ptolemy in support of his theory were borrowed from Hipparchus, and the nature of one of them suggests that they were taken from a great mass of observations, though Ptolemy himself says nothing to that effect. The astronomer who took a predecessor's star catalogue, and adding a constant correction to each star published it as the result of his own observations, would have left unnoticed all lunar observations by Hipparchus not absolutely necessary to establish his own theory. As a geometer Ptolemy has been ranked as certainly the fourth among the ancients, after Euclid, Apollonius, and Archimedes. He caused light to pass through media of unequal density, and thus discovered refraction, and he is said to have first recognized the alteration of the apparent position of a heavenly body which is due to this cause; but here again it is probable that Hipparchus anticipated him. Ptolemy wrote a universal geography, which continued to be the standard text book till the 16th century. He was the first to use the terms latitude and longitude, by which he laid down the position of each country and town. He proved the earth to be a globe, and calculated its inhabited parts to extend from the meridian of Thina, lon. 119° 30' E. of Alexandria, to the meridian of the Islands of the Blessed, 60° 30' W.; and from the parallel of Meroë, about lat. 16° 30' N., to that of Thule (Iceland or the Shetland islands), 63° N. The maps of this geography have been preserved with it. After him no one attempted for many centuries to reform geography except in the improvement of details. He was distinguished also as a musician, and wrote treatises on music, mechanics, chronology, and astrology; but probably most of these works were mere compilations. The best edition of the *Almagest* is by Halma (Greek text with French translation, 2 vols. 4to, Paris, 1813-'16).

PUBERTY, the period of youth characterized by the acquirement of functional power in the reproductive apparatus of the sexes; its ac-

tivity, however, cannot be called into exercise until the growth of the individual is completed, on penalty of premature and permanent exhaustion of the vital powers, and the development of any latent disposition to disease. That puberty is not the period of completed growth is shown by the increase in stature after its attainment, the subsequent complete ossification and consolidation of the extremities of the spinous and transverse processes of the vertebræ, and the consolidation of the pelvic, sacral, and coccygeal vertebræ, sternal pieces, and epiphyses of the ribs, scapula, clavicle, and bones of the extremities. In the human male puberty is established between the 14th and 16th years; besides the increased sexual and muscular development, the beard makes its appearance, the larynx enlarges, giving a lower, harsher, and stronger tone to the voice, and the thoughts, desires, and actions have a more manly character. In the female this period is arrived at between the 13th and 16th years in temperate climates, and somewhat earlier in the tropics and in the midst of the luxury and excitements of city life; there is a similar development in the reproductive system, usually coincident with the appearance of the catamenia and mammary enlargement, and a deposition of fat over the whole surface of the body. In the male there is at this time no special tendency to disease, nor in the healthy female; but, as a consequence of the defective physical training of most female youth, disorders of the menstrual function are very apt to occur, with numerous functional, nervous, and even organic complications; in persons of naturally weak constitutions, of both sexes, and in those enfeebled by premature exercise of the mental, physical, or generative powers, the tuberculous diathesis is frequently developed soon after puberty.

PUBLICOLA, Publius Valerius, a Roman law-giver of the semi-historical period of the foundation of the republic. He is said to have been present when Lucretia stabbed herself, and to have borne a prominent part in the expulsion of the Tarquins. After the compulsory resignation of Collatinus he was elected consul in his place (about 509 B. C.). In the war between the Tarquins and Veientes and the Romans, he gained a victory over the former. Returning to Rome, he began building a house on the Velian hill overlooking the forum, which excited a popular fear that he was seeking to raise himself to royal power. Valerius therefore ordered the building to be demolished, and his lictors when they appeared before the people to lower their fasces; whence he received the surname of Publicola or Poplicola, "the people's friend." He now brought forward laws for the establishment of the republic, one of which declared that whoever attempted to make himself king might be killed by any one; another, that plebeians condemned by a magistrate might appeal to the people. He was afterward thrice elected

consul; and the expedition of Porsena is placed during his time of office. With T. Lucretius Tricipitinus, his colleague, he routed the Sabines and returned to Rome in triumph.

PUBLIUS SYRUS, a Latin comic poet, who flourished at Rome at the time of Caesar's death (44 B. C.). He was a native of Syria, and was brought to Rome as a slave; but his master had him instructed and gave him his freedom. He improved the mimic art, and it is said by St. Jerome that a collection of moral sentences from the farces of Publius was a school book at Rome. A collection of this kind, comprising upward of 1,000 lines, each forming an apophthegm, extant under the title of *Publii Syri Sententiæ*, is in reality a compilation from various sources.

PÜCCOON, an aboriginal name applied to several plants with a yellow or reddish juice, but quite unlike in other properties. In the south, the bloodroot (*sanguinaria Canadensis*) is called puccoon. (See BLOODROOT.) In some parts of the west the name is applied to two species of *lithospermum*, of the borage family, both yielding a red dye; *L. hirtum* being the hairy, and *L. canescens* the hoary puccoon. The name is perhaps more generally used to designate *hydrastis Canadensis* than either of the foregoing, which is called, besides yellow puccoon, golden-seal, yellow-root, orange-root, Indian paint, &c. The genus *hydrastis* (Gr. ὕδωρ, water, and δράν, to act) belongs to the crowfoot family, or *rannunculaceæ*. It has a thick, knotted, yellow rootstock, from which rise a single radical leaf and a low, simple, hairy stem, bearing two leaves near the summit, and terminated by a single apetalous greenish white flower; the three petal-like sepals fall away when the flower opens, leaving the numerous stamens, and the cluster of 12 or more pistils, which in fruit become berry-like, and, being bright crimson, the cluster has the appearance of a raspberry. There is but one species, which is found from New York westward and southward, and is nowhere very common. It was used by the aborigines as a stimulant application to ulcers, and also as a dye; it is among the many reputed cancer cures. It is a tonic, and is regarded by some as having especial action on the liver and kidneys. In the western states it is used as an antiperiodic, as a substitute for quinine; the dose in powder is 30 to 60 grains. The so-called hydrastin of the eclectics, precipitated from a concentrated infusion by muriatic acid, is used in doses of three to five grains; it consists mostly of berberine.

PÜCKLER-MUSKAU, Hermann Ludwig Heinrich von, prince, a German author, born at Muskau, Lusatia, Oct. 30, 1785, died at Branitz, near Kottbus, Feb. 4, 1871. He studied in Leipsic, served in various armies, and was made prince by the king of Prussia in 1822. He laid out magnificent parks at Muskau and Branitz, but in 1845 sold the former domain. His private life was marked by eccentric habits. Among his principal works, which chiefly de-

scribe his extensive travels in Europe and the East, and are remarkable for racy delineations both of aristocratic and semi-civilized life, are: *Briefe eines Verstorbenen* (4 vols., 1830-'31; English translation by Mrs. Sarah Austin, "The Travels of a German Prince in England," 3 vols., 1832); *Andeutungen über Landschaftsgärtnerei* (1834); *Tutti Frutti* (5 vols., 1834; English translation by Edmund Spencer, 1834); *Semilasso's vorletzter Weltgang* (3 vols., 1835); *Semilasso in Afrika* (5 vols., 1836); *Südöstlicher Bildersaal* (3 vols., 1840); *Aus Mehemet Ali's Reich* (3 vols., 1844); and *Die Rückkehr* (3 vols., 1846-'48; English translation, "Mehemet Ali and Egypt," 3 vols., 1848). Ludmilla Assing has published *Fürst Pückler Muskau, sein Leben und Nachlass* (4 vols., 1873-'4).

PUDDLING. See IRON MANUFACTURE, vol. ix., p. 399.

PUEBLA. I. A S. E. state of the republic of Mexico, bounded N. and E. by Vera Cruz, S. by Oajaca, S. W. by Guerrero, and W. by Mexico, Tlascala, and Hidalgo; area, 9,598 sq. m.; pop. in 1869, 697,788. It is intersected from N. W. to S. E. by the Cordillera of Anáhuac, from which flow many small streams, but there are no large rivers. The drainage belongs partly to the gulf of Mexico and partly to the Pacific. The general elevation of the surface is about 6,000 ft., and a large part of the soil is fertile. The most valuable mineral productions are silver, marble, and alabaster. Abundant crops of grain, fruit, sugar, and cotton are produced; and iron, steel, glass, soap, and earthenware are manufactured. Many remarkable remains of ancient Mexican civilization are found in this state. II. A city (LA PUEBLA DE LOS ÁNGELES), capital of the state, 7,000 ft. above the sea, in lat. 19° 5' N., lon. 98° W., 76 m. E. S. E. of Mexico; pop. in 1869, 75,500. The streets are laid out generally at right angles to each other, and are broad and well paved. There are many fine squares; fronting the Plaza Mayor are the cathedral, the governor's palace, and the exchange. Puebla is the sacred city of Mexico, and contains more than 60 churches, 13 nunneries, 9 monasteries, 21 collegiate houses or higher theological schools, and many academies, charity schools, hospitals, and other benevolent institutions. Many of the churches and convents are rich in gold and silver ornaments, paintings, and statues, but some of them were injured by the French during the siege in 1863. The city is well supplied with water by a small stream on its E. side. The country around it is very fertile, it being easily irrigated by streams from the mountains. The climate is particularly mild and agreeable. Within sight of the city are the volcanic peaks of Popocatepetl, distant about 25 m. W. by S.; Iztaccihuatl, 30 m. W. N. W.; Malinche, 20 m. N. E.; and Orizaba, 60 m. E. Puebla is connected with the railway from Vera Cruz to Mexico by a branch road to Apizaco, 29 m. long, and a road is now building (1875) to connect it directly

with Vera Cruz.—Puebla was founded after the reduction of Mexico by the Spaniards, who built it six miles from Cholula, the sacred city of the Mexicans. It is noted for its protracted defence against the French under Gen. Forey in 1863, when it withstood a siege of two months. It was surrendered by Gen. Ortega on May 17, after the destruction of many of its buildings by bombardment, and the French made a triumphal entry on the 19th.

PUEBLO, a S. E. county of Colorado, intersected by the Arkansas river; area, about 2,200 sq. m.; pop. in 1870, 2,265. The tributaries of the Arkansas form fertile valleys, with intervening mesas or table lands, which afford excellent pasturage. The greater portion of the county is easily irrigated. The Denver and Rio Grande railroad traverses it. The chief productions in 1870 were 24,451 bushels of wheat, 99,390 of Indian corn, 39,822 of oats, 3,353 of peas and beans, 6,000 lbs. of wool, 14,963 of butter, and 1,366 tons of hay. There were 555 horses, 4,269 milch cows, 6,162 other cattle, 2,166 sheep, and 2,066 swine. Capital, Pueblo.

PUEBLO INDIANS, a general name applied by the Spaniards, and subsequently by Americans, to several tribes of semi-civilized Indians found by the former early in the 16th century in what is now New Mexico, who lived in permanent villages (*pueblos*). Alvar Nuñez (Cabeça de Vaca) passed through their country between 1529 and 1538; Friar Marco de Niza visited it in 1539, and Coronado in 1540. They were finally subdued by the Spaniards, who occupied the country in 1586. They were then as advanced as they now are, raising grain, vegetables, and cotton, which they spun and wove, and manufacturing pottery. Their houses are sometimes built of stone, laid in mortar made of mud, but more generally of sun-dried brick or adobe. These buildings are generally large, of several stories, and contain many families. In some of the pueblos the whole community, amounting to from 300 to 700 souls, are domiciled in one of these huge structures. The houses are sometimes in the form of a hollow square; at other times they are on the brow of a high bluff or mountain terrace, difficult of approach. The first or lower story is invariably without openings, entrance to the house being effected by ladders. Each upper story recedes a few feet from that below it, leaving a terrace or walk around or along the whole extent of the structure, from which ladders lead to those above. The upper stories have doors and windows, but no stairways. In most instances a single family occupies one apartment, and as its number increases another apartment is added when there is sufficient space, or it is built above and reached by a ladder. This mode was practised by these Indians three centuries ago. In every village there is at least one room large enough to contain several hundred persons, in which they hold their councils and have their dances.

These Indians constituted several distinct tribes with different languages. Some of them are now extinct; those still existing are: 1, the Zuñis, inhabiting Zuñi; 2, the Toltos, inhabiting Taos, with whom some unite the Picuries and the people of Sandia and Isleta; 3, the Tegnás in San Juan, Santa Clara, Nambé, San Ildefonso, Pojuaque, and Tesuque; 4, the Queres in Cochiti, San Domingo, San Felipe, Santa Aña, Zia, Laguna, and Acoma; and 5, the Jemes, occupying a town of the same name. The population of these 19 pueblos, and some now abandoned, toward the close of the last century was given at 10,000 or 11,000. Under the Spanish government schools were maintained and religious instruction given by Franciscan and other Catholic missionaries, who began their labors before 1600, and still continue them. They were protected from hostile tribes and oppression, and supplied with cattle and sheep; but under Mexican rule they were deprived of this support, and have declined till they now number only about 7,000. They were recognized as citizens under Mexican rule, but since New Mexico became a part of the United States the matter has been left in doubt. In 1857 Chief Justice Slough decided that the Pueblo Indians were under the treaty citizens of the United States. An act of congress passed Dec. 22, 1858, had confirmed old Spanish grants to the Pueblos. Their status as tribes has not, however, been recognized by any treaties; and though judicially declared to be citizens, the laws of New Mexico deprive them of the suffrage. They retain their own government, each village having an elected governor, and a court consisting of three old men; but executions for witchcraft have led to interference by the territorial authorities. A Baptist mission established a few years ago at Laguna led to dissensions and punishments there, which again called for interference. Under the division of tribes among the different denominations, the Pueblos, though Catholics, were assigned to the Christians, and, on their non-action, to the Presbyterians. This led to a protest from the governors of 15 pueblos at Santa Fé, Aug. 16, 1872, and to an appeal to the government made through the Catholic commissioner in 1874. Under the new agency eight schools are supported, which number 298 pupils. The total wealth of the Pueblo Indians in 1873 was given at \$535,750.

PUERPERAL CONVULSIONS, or *Puerperal Eclampsia* (Lat. *puer*, child, and *parere*, to bring forth), a dangerous disease occurring during the puerperal or lying-in period of women, either before, during, or after delivery. It has been the source of much discussion and disagreement, and although recent advances in physiological chemistry have shed much light on the causes of the disease, many points remain in dispute. It has been asserted by Dr. Karl Braun of Vienna that it is commonly the result of uræmic poisoning, and is produced mostly by carbonate of ammonia in the blood,

arising from decomposition of urea; but although it is conceded that uræmic poisoning is a frequent cause of puerperal convulsions, the ammonia theory, which originated with Dr. Frerichs of Berlin, is not generally accepted, and many believe that a variety of causes other than urea in the blood are competent to produce convulsions by acting upon the highly developed nervous system of the puerperal woman. Even when the attacks are connected with organic or functional disease of the kidneys, and when the urine is albuminous, the presence of urea in the blood is not always made out; and in many marked cases of albuminuria during pregnancy convulsions do not occur. Constipation, retention of urine, extreme pain, and great mental distress may, it is contended, bring on in the puerperal state convulsions precisely similar in character to those produced by uræmia. According to Braun and Wiegner, more than half of all the cases occur during labor, but others consider the relative frequency during the three epochs to be in the order, pregnancy, labor, delivery. It is more likely to occur in first than in succeeding labors. The frequency of the disease, as indicated by statistics, is about one case in 350 labors. There are usually, but not always, premonitory symptoms. One of the most important and common of these is œdema or dropsy, especially of the ankles and feet, which is usually developed some weeks before the appearance of the first fit. When this symptom is present, an examination of the urine is almost sure to reveal by the ordinary tests of heat and nitric acid the presence of a large quantity of albumen; and there may generally be found, by the aid of the microscope, several tube casts, sometimes accompanied with blood corpuscles, or there may be evidence of a more advanced stage of Bright's disease. Pregnancy disposes toward this condition by reason of obstruction to the circulation from pressure of the gravid uterus. There are three objective premonitory symptoms which are also important: extremely acute headache, derangement of vision, and pain in the epigastrium. The headache is generally in the frontal region, at first intermittent, but gradually becoming continuous. Derangement of vision is a grave symptom; sometimes there is cloudiness or dimness, at others objects appear to change color; there is often double vision, or only half of an object may be seen; there are flashes of light, and sometimes the sight is suddenly lost. The convulsive seizure is characteristic, and to have witnessed it once will impress its prominent features upon the memory. After a few precursory symptoms the patient seems deeply absorbed and preoccupied; then her gaze becomes fixed and her whole body motionless. This is soon succeeded by twitchings of the eyelids and facial muscles. The eyeballs roll upward so that only the whites are seen. The contractions of the muscles from being spasmodic or clonic

become tonic, as it is called; that is, they become more persistent. The angles of the mouth are strongly drawn to one side, the muscles of the neck drawing the head in the same direction. After a few moments these parts will be drawn in the contrary direction. From the head the convulsive phenomena rapidly extend to other parts of the body. The extensor muscles of the trunk contract, producing the condition called *opisthotonos*, and the whole trunk becomes perfectly rigid. The neck swells, the jugular veins becoming prominent, and the carotid arteries beat violently. Contraction of the muscles of the larynx causes suspension of respiration, the capillary circulation becomes impeded, and the face assumes a livid hue. The tongue is often severely bitten between the convulsively closed jaws. In about half a minute these tonic convulsions are generally succeeded by those of a clonic character, and jerking movements of all the muscles succeed, the countenance becoming frightfully distorted. The pulse, strong and full at the commencement, is rapidly accelerated by the convulsions, but at the height of the paroxysm is very feeble. It is during the middle stage, that of tonic convulsions, that death is immediately imminent, when the respiration is suspended and the condition is that of profound asphyxia. When recovery from the attack takes place, the symptoms gradually abate; the convulsive movements become less violent and then less frequent; the respiration becomes more regular but stertorous, and the circulation more active; and the skin resumes its natural color. The patient does not immediately regain consciousness, but remains in a comatose condition, the duration of which depends upon the intensity of the paroxysm; sometimes only a few minutes elapse, at others several hours. But recovery from the tonic stage may not take place, or there may be a succession of fits with intervals so brief that consciousness is not recovered between them, and the patient dies in a state of coma. In case of recovery, on regaining sensibility a confused feeling with headache is complained of, and she has no recollection of what has taken place. Sometimes there is impairment of vision or of hearing, or both. As to the effects of these convulsions, they may, if occurring before the lying-in period, bring on premature labor and destroy the life of either the mother or the child, or both, or they may happily terminate in recovery. When the attack precedes delivery, it frequently happens that the birth of a child removes the conditions upon which the convulsions depend, and the patient is immediately relieved. After delivery the attack may be followed by dangerous hæmorrhage, from non-contraction of the uterus, due to exhausted nervous energy or to the impoverished state of the blood. In some cases the recovery is surprising, and it often takes place contrary to the predictions of the most experienced. The treatment is prophylactic or

preventive, and curative. The prophylactic treatment consists in eliminating the urea from the system when present, by the use of diuretics and purgatives, and in relieving excessive plethora by bloodletting, which may sometimes be freely employed with advantage.

PUERPERAL FEVER, or *Childbed Fever*, a disease which attacks lying-in women, generally attended by an inflammation of the peritoneum, or of the uterus and its appendages, of a dangerous character. The name puerperal fever was given by Strother in his work on fevers (1716). Hippocrates gives accounts of cases of death in lying-in women which resembled the puerperal fever of to-day, as do Celsus, Galen, Avicenna, and others down to near the 17th century. From observations extending through the last two centuries it has been generally believed that the disease often prevails epidemically. It has been observed that lying-in women, attended by physicians coming from cases of erysipelas, gangrene, or sloughing sores of any kind, or from making post-mortem dissections, are very liable, sometimes almost certain, to be attacked with puerperal fever. These facts have caused several good authorities to regard the disease as due to the absorption of septic matter by an abraded surface on the body of the patient. Denman, an English obstetrician, is said to have been the first to assert that puerperal fever is often propagated by the medical attendant; and this view of the subject has been recently more particularly examined, and, with others in regard to its propagation by septic contact, adopted in Germany. That absorption may occur, there must be a fresh wound or abraded surface; if granulations have taken place, absorption is prevented. Now fresh wounds exist in every parturient woman in consequence of laceration or abrasion during labor, and infection may take place by decomposition in the tissues of the patient, or it may have an external origin. The authorities who embrace these views do not therefore regard puerperal fever as contagious in the usual sense of the word, that is, spread by a specific contagion; but admit that it is manually transferable, while the septic matter may be brought from an external source in which puerperal fever is not present.—The virulence of cases which have been called puerperal fever has varied very greatly at different times and in the practice of different physicians, and the post-mortem appearances of the fatal cases have been unlike. Sometimes there would be found extensive lesions, not only in nearly all the pelvic viscera, but in other parts of the body. Sometimes there would be peritonitis alone, or with very few complications, and sometimes only the uterus would present much evidence of inflammation; and in some of the most rapidly fatal cases no evidence of established inflammation would be found. Moreover, the number of recoveries would be great in the practice of some physicians, and many of the cases would present symptoms indica-

ting little more than inflammation of the connective cellular tissue of the pelvic cavity. It will therefore be seen that the subject is one of the most difficult and perplexing which writers on obstetrics have to meet. No system of classification has been generally agreed upon, but several authorities, with the sanction of Sir James Y. Simpson and others, embrace within the term puerperal fever all those lesions of pelvic organs and tissues which in the puerperal state, under favorable circumstances, are liable to engender and propagate septic poison. But it is asserted by many high authorities that there is a form of the disease which is characterized from the first by symptoms indicating the operation of a virulent poison, and which has received the name of malignant puerperal fever, or puerperal typhus. This may be regarded as the true epidemic puerperal fever. Those who maintain these views also believe in the contagiousness of the disease, and in their classification they separate epidemic puerperal fever from such affections as are specially named puerperal metritis, puerperal peritonitis, puerperal phlebitis, puerperal pelvic cellulitis, and puerperal septicæmia and pyæmia. The symptoms of epidemic or malignant puerperal fever usually commence with a chill between the first and third days after delivery, rarely being deferred to the fifth day, although sometimes to the eighth or ninth; but this is not one of the most important symptoms, for it is sometimes so slight as not to attract attention. In some cases, however, it is very severe and lasts 30 or 40 minutes or longer, and during the chill the pulse is small and quick; afterward it becomes fuller but more compressible, ranging from 110 to 150. There is more or less delirium, and vomiting is quite common. Sometimes these symptoms are intensified, and the patient succumbs to the attack in 24 or 48 hours. In cases of the epidemic disease post-mortem examination will sometimes reveal not many pathological changes, but sometimes they are quite extensive and similar to those in septicæmia and pyæmia. In cases of puerperal peritonitis, there may be nothing found except indications of inflammation of the peritoneum; but in cases of septicæmia and pyæmia there will usually be found abscesses in different parts of the body. The uterus will be found cedematous, and its lymphatics are usually distended with purulent contents, which are often traced to ulcers on the neck of the womb. There are often dilatations in the lymphatics as large as a hazel nut, filled with pus; and there are frequently abscesses in the body of the uterus causing perforations into the peritoneal cavity. The cellular connective tissue becomes inflamed and filled with serum, and often pelvic peritonitis follows this, and may extend to the general abdominal cavity, its contents becoming more or less adherent to each other from the formation of false membrane. Changes occur in other cavities besides that of the peritoneum; extravasations of blood

are often found beneath the lining membrane of the heart and the mucous membrane of the intestines. There is also often found pericarditis and inflammation of the joints, most frequently in the shoulder and knee, the pus undermining the surrounding parts, often to a great extent. Embolism of the blood vessels is common, especially in the lungs, the thrombi which form in these organs breaking up and passing on into the circulation. Pneumonia is frequent, with a great tendency to gangrene, caused by the presence of putrid emboli. The spleen is frequently enlarged, of a pulpy, greasy consistence and of a chocolate color; and the liver presents marks of fatty infiltration, embolism, and disintegration of liver cells.—The treatment in all these puerperal diseases depends upon the extent and intensity of the attack, and upon the organs involved, and consists to a great degree in prophylactic measures, such as cleanliness, including the prevention of the reabsorption of septic matter, and a bland but not innutritious diet. The medical attendant should exercise the most extreme care not to approach the lying-in chamber after attending cases of erysipelas or scarlet fever, or any other contagious disease. If he has recently attended a post-mortem dissection, he should bathe his person, use carbolic or salicylic acid gargles, and change his entire clothing.—See “Clinical Lectures on Diseases of Women,” by Sir James Y. Simpson, M. D. (Edinburgh, 1871); “A System of Midwifery,” by William Leishman, M. D. (Glasgow, 1873); “On the Nature, Signs, and Treatment of Childbed Fever,” by Charles D. Meigs, M. D. (Philadelphia, 1872); “The Puerperal Diseases,” by Fordyce Barker, M. D. (New York, 1874); “Erysipelas and Childbed Fever,” by Thomas C. Minor, M. D. (Cincinnati, 1874); and “A Manual of Midwifery,” by Dr. Karl Schroeder (New York, 1875).

PUERPERAL MANIA, a form of mental derangement which attacks women during the lying-in period. It is to be distinguished from the melancholia which occurs at the same period, although some authors treat both affections under one head, either that of puerperal mania or puerperal insanity. It is also to be distinguished from the insanity of pregnancy and the insanity of lactation, affections which are liable to occur in the earlier stages of pregnancy, or during lactation after the puerperal period has passed; and it is also distinct from the delirium of labor. The insanity of pregnancy, which generally occurs between the third and seventh months, may be caused by derangement of some of the bodily functions, usually associated with an anæmic condition, and, according to Esquirol, dependent in more than one third of the number of cases upon hereditary predisposition. The insanity of lactation generally occurs after the sixth month of that period, and therefore its principal cause, weakness from the exhaustion of nursing, is appa-

rent. The delirium of labor is caused by the over-excited or erethistic condition of the brain in consequence of the intensity of the pains of labor. It is of much rarer occurrence since the use of anesthetics in labor than formerly. Puerperal mania generally comes on during the first two weeks after confinement, while melancholia is rarely developed until the latter part of the month. Among other prominent premonitory symptoms are sleeplessness, loquaciousness, and aversion toward friends; and a short period before the attack there are often movements of the eyelids and facial muscles. At the moment of attack the facial expression is often peculiar, the features becoming drawn and pallid, with an expression of fright mingled more or less with that of rage. The patient then becomes boisterous, stares wildly and makes rapid gestures, clutches at things and persons near her, throws off her covering, and attempts to jump out of bed; and her language will often be so profane as to mortify her friends. The skin is cold, pallid, and clammy, and the pulse is small, quick, and irritable. There is great muscular weakness, which however sometimes alternates with great spasmodic strength.—Among the predisposing causes heredity is the most frequent, and it is said to be generally traceable to the female side of the family. The pathological condition of the brain is therefore similar to that of insanity in general, but this cannot always be demonstrated by microscopical examination. The principal exciting cause is mental emotion, and it has been observed that those who possess the most sensitive organizations and have been particularly the victims of treachery are much more likely than others to be attacked. Formerly it was frequently held that the disease was of inflammatory origin, being a modification of phrenitis; but the opinion advanced by Gooch, that "it is not a disease of congestion or inflammation," has been sustained by modern experience. Dr. Ferriar believes that the loss of reason is often principally due to some interference with the establishment of lactation. Convulsions which occur after labor are frequently followed by mania. It seems to be well established that there is an essential connection between puerperal mania and albuminuria; but the indications of the presence of albumen are less persistent than in convulsions.—Bleeding, which was once a common practice, is now regarded as injurious in all but a very few exceptional cases, as the disease is nearly always associated with an anæmic condition of the blood and a state of nervous exhaustion. The best therapeutic agent for relieving the cerebral excitement is perhaps the hydrate of chloral, and it is said to have a much better effect than pure chloroform. The most important remedial treatment, however, is the use of nutritious food to restore the exhausted nervous energy by reëstablishing the organic functions. Ferruginous tonics may also be given with advantage.

PUERTO BELLO. See PORTO BELLO.

PUERTO CABALLOS. See CORTES.

PUERTO CABELLO, a seaport town of Venezuela, in the province of Carabobo, on Trista bay, 70 m. W. of Carácas; pop. about 8,000. The town is principally on an island, which is connected with the mainland by a bridge. The climate is hot and unhealthy, but the harbor being fine, the place is the seat of a considerable trade. During the year ending Sept. 30, 1873, the total value of the imports was \$3,691,237; of the exports, \$5,118,788; entrances, 205 vessels, of an aggregate tonnage of 103,476, of which 50 were German, 38 English, 32 Dutch, 27 Venezuelan, 19 Spanish, 13 French, 12 Danish, 10 American, 2 Austrian, and 2 Italian. The principal exports are cotton, coffee, cacao, indigo, sugar, cocoanuts, hides, lumber, and cabinet and dye woods. Of 20,011,801 lbs. of coffee exported in 1873, 6,212,890 came to the United States.

PUERTO LA MAR. See COBIJA.

PUERTO PLATA, or **Porto Plata**, a seaport town of Santo Domingo, on the N. coast, 100 m. N. N. W. of Santo Domingo city; pop. about 3,000. It lies on the slope of a mountain at the foot of a crescent-shaped bay. The harbor has good anchorage, but shallows rapidly near the shore, and ships are loaded from lighters. The trade, principally in tobacco, is in the hands of foreign merchants, mostly Germans. In 1873, 201 vessels, of 12,191 tons, entered the port; of these 75 were English, 37 Spanish, 34 German, and 20 American. The total value of the imports in 1873 was \$871,116; of the exports, \$1,093,753.—Puerto Plata is said to have been planned by Columbus on his first voyage. In the beginning of the 16th century it was largely resorted to by Spanish vessels. It has been destroyed several times, the last time by the Spaniards when they evacuated the island in 1865.

PUERTO PRINCIPE, *Santa Maria de*, a city of Cuba, capital of the Central department, about midway between the N. and S. coasts, 305 m. E. S. E. of Havana, and 45 m. W. S. W. of Nuevas, its port, with which it is connected by railway; pop. about 30,000. It lies between two small streams, the Tinima and the Jaticbonico, in a rich agricultural district, the chief products of which are sugar and tobacco. The climate is hot, moist, and unhealthy. The city is irregularly built. Its chief buildings are several churches and monasteries, a hospital, and two theatres. Its trade is inconsiderable compared with its population. Puerto Principe was formerly the seat of the supreme court of all the Spanish colonies in America. It has been threatened several times during the present war by the Cuban patriots, and two or three battles have taken place in its vicinity.

PUFENDORF (often spelled **PUFFENDORF** by English writers), **Samuel**, a German jurist and publicist, born near Chemnitz, Saxony, Jan. 8, 1632, died in Berlin, Oct. 26, 1694. He was educated at Grimma, studied theology at the uni-

versity of Leipsic, and in 1656 went to Jena to devote himself to mathematics and philosophy under Erhard Weigel, at the same time applying himself to the law of nature. On quitting Jena he became tutor to the son of the Swedish ambassador at Copenhagen, and while there prepared a work on general law, in which the principles of Grotius, Hobbes, and other jurists were combined with observations of his own. This was published in Holland in 1660 under the title of *Elementa Jurisprudentiæ Universalis*. It was dedicated to the elector palatine, Charles Louis, who in 1661 founded at Heidelberg a professorship of the law of nature and of nations, and placed Pufendorf in the chair. His lectures were very popular, and the university recovered during his residence much of its ancient prestige. In his *Severini a Monzambano, De Statu Imperii Germanici* (Geneva, 1667) he showed that the Germanic system was an incongruous assemblage of discordant parts, and the parent of many social and political abuses, and suggested practical remedies. The work was translated into the chief languages of Europe, but excited much hostile criticism in Germany, particularly in Austria, where it was ordered to be burned by the hangman. Pufendorf defended the work without acknowledging the authorship, but found his position so uncomfortable, in consequence of the acrimonious controversy with German publicists, that in 1670 he accepted from Charles XI. of Sweden the professorship of the law of nations at Lund. In 1672 he published there the work on which his reputation now rests, the treatise *De Jure Naturæ et Gentium* ("On the Law of Nature and Nations"), of which in 1673 he prepared an abridgment with some variations, entitled *De Officio Hominis ac Civis Libri duo* ("On the Duties of a Man and a Citizen"). On the invitation of the king of Sweden he removed to Stockholm, was appointed councillor of state and royal historiographer, and published *Commentarii de Rebus Suecicis ab Expeditione Gustavi Adolphi usque ad Abdicationem Christianæ* (Utrecht, 1676). In 1688 he accepted a similar office, with an annual pension of 2,000 crowns, at the court of Frederick William, elector of Brandenburg, the history of whose reign he published under the title of *Commentarii de Rebus Gestis Frederici Wilhelmi Magni, Electoris Brandenburgici*. In 1694, shortly before his death, and while he was in Berlin, the king of Sweden created him a baron. Of his great treatise, first printed in German at Leyden in 1672, and afterward at Frankfort much augmented (1684), the best edition is that published at Leipsic *cum Notis Variorum* by G. Mascov (2 vols. 4to, 1744). The French translation by J. Barbeyrac (2 vols. 4to, Amsterdam, 1712), with notes, is the version most esteemed. There is an English version by Basil Kennet, with Barbeyrac's preface and notes translated by Carew (London, 1749). Pufendorf wrote several less important works.

PUFF BALL. See LYCOPERDON.

PUFF BIRD, an appropriate name for the *bucconinae*, an American subfamily of diurnal fissirostral birds, placed by Gray in the kingfisher family, but by the older and some modern writers in the scansorial family of barbets or *capitoninae*; the generic name *bucco* is applied by Cuvier to the latter. In the typical genus *bucco* (Linn.), as recognized by Gray, the bill is long, strong, elevated, and very broad at the base, where it is furnished with tufts of strong bristles, and suddenly curved at the tip, which is hooked; the gape very wide; nostrils concealed by the projecting plumes and bristles; wings moderate and rounded, the first quill short and the fourth the longest; tail long, broad, even, rounded on the sides; tarsi shorter than the middle toe, strong, and covered in front with transverse scales; toes two before and two behind, the outer anterior the longest, and the claws long and acute. There are about



Pied Puff Bird (*Bucco macrorhynchus*).

a dozen species described, in tropical South America; the name is derived from their habit of puffing out the plumage of the head, which gives them a heavy and ill balanced appearance. They are solitary, silent, and melancholy-looking, living generally in retired woods, perching on some low and thickly leaved branch, with the large head drawn between the shoulders; thus they remain for hours at a time, occasionally darting after insects, returning to the same perch, which they are said to frequent for months together; they sometimes climb like woodpeckers, supported by the tail, in search of insects in the bark; the nest is made in the hollows of trees; they are not shy, and sometimes select spots near human habitations; their colors are sombre, very different from those of the barbets, with which some authors have classed them. The collared puff bird (*B. collaris*, Lath.) is 7½ in. long; rufous above, striated with black; whitish on the chest, terminated by a broad black band; a similar band across the shoulders; abdomen

rufous white; bill $1\frac{1}{2}$ in. and horn-colored. The pied puff bird (*B. macrorhynchus*, Gmel.) is black, with a black and larger bill; general color black, with forehead, throat, abdomen, and tip of tail white.—Figures of many of these puff birds may be found in Swainson's "Birds of Brazil and Mexico" (London, 1841).

PUFFIN. See **AUK**.

PUGATCHEFF, Yemelyan, a Cossack chieftain and pretender to the throne of Russia, born at Simoveisk on the Don in 1726, executed in Moscow, Jan. 21, 1775. He first appeared as the leader of a band of disciplined robbers. In the seven years' war he served against the Prussians, and subsequently in the Russian campaign of 1769 against Turkey. Returning to his native land, he was imprisoned for seditious conduct; but having recovered his liberty, he went to Yaitzkoi, where a striking resemblance noticed between himself and Peter III. prompted him to pass himself off as the murdered monarch, to forge a tale about his escape from death, and to declare that he was now to set about the task of dethroning Catharine II. and regaining his crown. The insurrection broke out in the middle of 1773, when a manifesto of Pugatcheff in the name of Peter III. was published. After he had got possession of the fortress of Yaitzkoi, and the religious sect of the Raskolniks, of which he had become a member, had embraced his cause, the peasantry went over to his side in large numbers, and many Tartar and Finnish tribes joined him. With these he took numerous fortresses on the Ural, the Volga, and the Don, and marched upon Moscow; but he was betrayed by his comrades for 100,000 rubles to Michelson and Suvaroff. In this insurrection 100,000 lives were lost.

PUGET, Pierre, a French artist, born in Marseilles, Oct. 31, 1622, died there, Dec. 2, 1694. He was apprenticed to a ship builder and wood carver, travelled on foot to Italy, and after suffering great hardships obtained admission to the studio of Pietro da Cortona in Rome. Returning to Marseilles in 1643, he was commissioned by the duke de Brézé to design a magnificent ship, which, in honor of the queen, Anne of Austria, was called *La Reine*, and Puget devoted three years to decorating it with carvings. He next went to Italy again, and spent some years in copying antique monuments and in art and architectural studies. In 1653 he returned to France, and painted many church pictures for Marseilles, Aix, Toulon, Cuers, and La Ciotat. Ill health obliging him to give up painting in 1655, he devoted himself to sculpture and architecture. The gate and the balcony of the city hall at Toulon, which he built and carved, were his first works. He then went to Genoa, where he executed many important works. In 1665 he was recalled to France by Colbert, and appointed director of ship decorations at the dockyard of Toulon, where he also began to build an arsenal; but its progress being hinder-

ed by official intrigues, he retired to his native city. While at Toulon he had partly sculptured in Carrara marble the group upon which his fame mainly rests, his "Milo of Crotona devoured by a Lion." It was finished in 1683, for the gardens at Versailles. His group of Andromeda and Perseus was completed in 1685, and brought to Versailles by his son; three years later he himself went there with his bass relief of Alexander and Diogenes. After his return to Marseilles, he superintended the building of a church, executed his last work in bass relief, "The Plague of Milan," and spent his later years in retirement.

PUGET SOUND, in a general sense, the body of water which extends S. from the E. end of the strait of Fuca, through which it communicates with the Pacific ocean, into the N. W. portion of Washington territory, for a distance in a direct line of about 80 m. Its principal constituents are Admiralty inlet, Puget sound proper, the S. termination of this inlet, and Hood's canal. Admiralty inlet extends from the strait of Fuca a little E. of S., with an average breadth of nearly 6 m., for 70 m., and communicates with the sound proper through the "narrows," 1 m. wide and 4 m. long. The sound extends S. W. from the narrows, ramifying into numerous bays and inlets, and containing many islets. Hood's canal branches off from Admiralty inlet 18 m. S. of the strait of Fuca, and extends S. W., with an average breadth of 2 m., for 50 m., when it bends abruptly and extends N. E. for 15 m., nearly connecting with the waters of the sound. Hood's canal on the one hand and Admiralty inlet and the sound on the other enclose a peninsula, of which Kitsap co. forms the greater part. As determined by the United States coast survey, the coast line of Admiralty inlet measures 334 nautical miles; of Puget sound proper, 280; of Hood's canal, 192; total, 806. These bodies of water are all navigable, and the smaller inlets afford numerous safe, deep, and capacious harbors. The shores are fertile, and are covered with abundant timber. The chief towns are Olympia, the capital of the territory, at the S. extremity; Steilacoom, Tacoma (the N. terminus of the Pacific division of the Northern Pacific railroad), and Seattle, on the E. shore; and Port Townsend, at the N. W. extremity. The sound was named after an officer in Vancouver's expedition.

PUGHE, William Owen, a Welsh author, born at Tyn y Bryn, Merionethshire, Aug. 7, 1759, died June 4, 1835. His original name was William Owen, to which he added that of Pughe late in life, on receiving an inheritance. At the age of 17 he went to London to earn his living, and there made the acquaintance of Owen Jones, a tradesman, with whose support and encouragement he entered upon the study of ancient Welsh literature. The two published in conjunction in 1789 the poems of Dafydd ap Gwilym, a bard of the 14th century. This was followed by the works of

other poets and by translations; and in 1801, a third Welshman, Edward Williams, being associated with them, they published the first two volumes of the "Myvyrian Archaeology;" a third volume appeared in 1807. Pughe also prepared a Welsh and English dictionary (1793-1803), and the "Cambrian Biography" (1803); published a Welsh magazine entitled *Y Greil*; and translated into Welsh the "Paradise Lost," Heber's "Palestine," and other poems.—His son, ANEURIN OWEN (1790-1851), who dropped the name of Pughe, edited "Ancient Laws and Institutes of Wales," printed by the record commission in 1841.

PUGILISM (Lat. *pugil*, a boxer), the art of fighting with the fists, practised in modern times according to certain rules, known as the rules of the English prize ring. It is said that Theseus was the inventor of the art of boxing, or the skilled use of the fists and arms in assault and defence. Homer describes pugilistic encounters, and Pollux, Hercules, and others are mentioned as excelling in pugilism. Boxing was one of the most important exercises in the Olympic games. The ancient pugilists fought with the *cestus*, formed of strips of leather wound around the fist and arm, frequently as far up as the elbow. This was sometimes studded over the fist with knobs loaded with lead or iron, and was practically the same as the brass knuckles of the present day. The *cestus* used by the Greeks was of various kinds, called *μελίχαι*, *σπίραι*, *βοείαι*, *σφαίραι*, and *μύρικες*. The *μελίχαι* were the softest, and the *μύρικες* the hardest. The rules of boxing in ancient times resembled those of the modern prize ring, except that wrestling was not permitted. The right arm was used chiefly in offence, the left arm serving to protect the person. The ears were much exposed to injury in the old games, and they were sometimes protected by covers. With the *cestus*, especially when loaded with knobs of metal, the ancient pugilistic encounters must have been terribly severe, resulting often in mutilation, and sometimes in death. At the Olympic games the boxers were usually naked, or wore simply a girdle around the loins. In the earliest times boxing at the games was permitted only between freemen and those who had not committed crime. Contests between boys were early introduced at Olympia.—The art of boxing, as now practised, may be said to date from the building in London of a theatre for exhibitions of the "manly art of self-defence" by one Broughton, about 1740. Broughton, who for 18 years was champion of England, is said to have invented boxing gloves. He held exhibitions in his theatre, and laid down certain rules for fighting, quite similar to those of the present day. But for many years before the time of Broughton pugilistic encounters had been common at fairs and festivals in England. The funds for the erection of Broughton's theatre were provided by about 80 of the noblemen and gentry of England, and the en-

counters were witnessed by the best blood in the land, including the prince of Wales. Jackson, who was champion in 1795, is now regarded as having been one of the most skillful professors of the art. He gave instruction to many of the aristocracy, among whom were Lord Byron and Shaw, the life-guardsmen. The prominent points in Jackson's system were the use of the legs in avoiding blows and the correct estimate of distance, striking no blows out of range. In 1817 the future emperor Nicholas of Russia witnessed a prize fight in England, and shook hands with the victor. Since that time the prize ring has gradually fallen into disrepute; but for a long time the principle of "fair play" was strictly adhered to in England. At the present day prize fighting is practised only in Great Britain and America. The brutality of such exhibitions has at last excited the general condemnation of society, and for more than half a century the practice has been under the ban of the law. The rough character of the assemblages on such occasions, and the frequent "selling out" and fraud in the encounters, have disgusted those of the patrons and professors of the "manly art" who believed in fair play. It is thought that very few of the fights which have occurred within the past few years have been honestly conducted.—Although prize fighting has deservedly fallen into disrepute, many persons practise boxing for exercise and amusement, the rules being essentially those of the prize ring (commonly abbreviated to P. R.). The present rules are briefly as follows. The ring shall be on turf, formed of a square of 24 ft., bounded by a double line of ropes attached to eight stakes. The lower rope is 2 ft. and the upper 4 ft. from the ground. The choice of "corners" is determined by the toss of a coin. The winner of the choice selects his corner according to the state of the wind and the position of the sun, it being an advantage to have the sun in his opponent's face. The loser takes the opposite corner. A space is marked off in each corner large enough to accommodate the man, his second, and his "bottle-holder," who are allowed to attend their man in the ring. The colors of the men are tied around the stakes at their respective corners. Each man names his second and bottle-holder. The seconds agree upon two umpires, one for each man. The umpires usually select a referee, unless one be agreed upon in some other way. The referee directs the contest, and decides the fight and all questions of fairness, and his decision is binding and final. The umpires watch the fight in the interests of their respective men, and call upon the referee for a decision regarding all questions of fairness. The referee withholds all expressions of opinion until he is appealed to by the umpires, or until the close of the fight. The referee and umpires are so placed as to be able to watch the fight, but no one is allowed within the ring except the men with their seconds

and bottle-holders. The men are stripped before the fight by their seconds and dressed for the contest. The dress is usually knee breeches or drawers, stockings, and shoes, the soles of the shoes being provided with spikes three eighths of an inch long and one eighth of an inch broad at the points. The men are naked above the belt. The seconds and umpires see to it that no improper articles are used in the dress. The men are allowed nothing in their hands, and no resin or other sticky substance is allowed upon the fists. One of the umpires is selected to act as time-keeper. It is his duty to call "time" at the expiration of 30 seconds after each round. If one of the contestants fails to come to "the scratch" within eight seconds after time has been called, he is considered to have lost the fight. The scratch is a straight line drawn through the centre of the ring between the two corners. The bottle-holder is provided with a bottle of water and a sponge, and it is the duty of the second and bottle-holder to take their man to his corner at the close of each round, render him all needed assistance there, and bring him to the scratch when time is called. The second and the bottle-holder are not permitted to approach their man during a round, or to give him advice at that time, and are cautioned not to injure the antagonist when they pick up their man at the close of a round. When the man cannot come to the scratch at the call of time, the second usually throws up the sponge as a token of defeat, and the victor takes his antagonist's colors as a trophy. The men being ready, time is called, and each man is conducted to his side of the scratch by his second. The men shake hands with each other, the seconds do the same, the latter retire to their corners, and the fight begins. When time is called after a round, the principal rises from his second's knee, and walks unaided to the scratch. A round is considered closed when one or both men are down, either from a knock-down blow or from being thrown after they have closed. Unless there is a knock-down, the rounds usually terminate in a clinch. The following acts are considered foul: wilfully falling without receiving a blow at the time of falling, except that one may slip from the grasp of his antagonist after the men have closed; butting with the head, gouging, scratching, biting, kicking, or falling upon the antagonist when he is down; striking the antagonist below the belt, or grasping him by the legs, and striking the antagonist when he is down (a man with both knees or with one hand and one knee upon the ground is considered down). If one of the umpires claim a foul, the referee may caution the man and his second, or may declare that the man against whom the foul is claimed has lost the fight. The referee's judgment is usually based upon his opinion as to whether the foul was intentional. In case of disputes, the men retire to their respective corners pending the decision of the

referee. In case any circumstance interfere with the progress of the fight, the referee may appoint another time or place of meeting, at which the fight is to be continued; but unless it is concluded within a week, the battle is considered drawn. The referee has power to cause the men to be separated when one is in such a position across the ropes as to be helpless or in danger of his life.—The first prize fight in the United States took place in 1816, between Jacob Hyer (father of the celebrated Tom Hyer) and Tom Beasley, the result of which was a draw. The rules of the ring were observed during the first part of this fight, but it soon degenerated into rough-and-tumble, and friends of the men interfered after one of Hyer's arms had been broken. This was followed by numerous fights of a more scientific character. Among the most celebrated was the fight between Tom Hyer and "Yankee" Sullivan, in 1849. Numerous other fights occurred between 1849 and 1860, when the so-called great international fight took place in England between John O. Heenan of New York and Tom Sayers, champion of England. This was very severe, and the general opinion has been that Heenan was the winner, although no decision was given by the referee, the fight being interrupted by breaking in the ring.—In the accounts of fights, particularly those published in the earlier history of the English ring, the slang words and expressions used are peculiar, and some of them are quite descriptive and suggestive. The following are some of those commonly met with in pugilistic writings: "Bellows," lungs; "bellowser," a blow in the pit of the stomach, taking one's breath away; "blinker," a blackened eye; "bore," to press a man down by force of weight and blows; "brain canister," "knowledge box," "lob," "lolly," "nob," the head; "buff," the bare skin, as "stripped to the buff"; "cant," a blow; a "cant over the kisser," a blow on the mouth; "castor," a hat (before entering the ring, the pugilist generally tosses in his "castor"); "chancery," a position in which a pugilist gets his opponent's head under his arm; "claret," blood; "claret jug," "conk," "nozzle," "proboscis," "snuff box," "snorer," "snout," the nose; "cork," to give a bloody nose; "daylights," "goggles," "peepers," "squinters," the eyes; "fancy," a general name for pugilists; "fibbing," striking blows in quick succession at close quarters; "fives," "a bunch of fives," the fist; "fives court," a boxing hall; "send to grass," to knock down; "groggy," used to describe the condition of a pugilist when he comes to the "scratch" weak on his "pins," "grubber," "kisser," "oration trap," "potato trap," "whistler," "ivory box," the mouth; "mauley," the fist; "mill," a fight; "mourning,"—"to put the eyes in mourning," to blacken the eyes; "painted peepers," blackened eyes; "pins," the legs; "portmanteau," the chest; "rib roaster," a blow on the ribs;

"smeller," a blow on the nose.—A closely contested prize fight taxes a man's strength, endurance, and "pluck" to the utmost; and, however courageous he may be, poor physical condition is so great a disadvantage that it can hardly be overcome in the face of good condition of an antagonist, the skill, courage, and strength of the men being equal. It has therefore been considered of the last importance to bring a man into the ring perfectly trained. The duration of rigid training depends largely upon the previous muscular condition; but two or three months are usually sufficient. Without going into the minutiae of the different training systems, it will be sufficient to indicate the general method and the main objects to be attained. Fat is inert, useless matter during a fight, and is to be eliminated from the body as far as is possible without depressing the nervous energy. The muscular system should be developed to the highest degree. The nervous system should act promptly and perfectly, a condition essential to endurance, which is probably the most important quality in a pugilist. The respiration should be free and performed with the smallest expenditure of nervous and muscular force. Finally, the temper and judgment should be clear, the skill as great as possible, and the man should have the moral and physical force to fight to the last extremity of endurance. To secure these ends, the diet is restricted to lean and easily digestible meats, stale bread or toast, a small quantity of vegetables, and a very moderate quantity of liquids; but the amount of food should be sufficient to satisfy the appetite, never allowing the nervous system to become depressed. The exercise is such as to develop the general muscular system, particularly the muscles employed in hitting, and the legs. To secure perfect condition of the nervous power, all sources of mental irritation are avoided, sexual intercourse is interdicted, and stimulants, if taken at all, are used with care and in very small quantity. Tea may be used moderately once a day, without sugar or milk; a glass of sherry with a raw egg or a glass of old ale may be taken once a day, though it is generally best to avoid alcohol. It is of the greatest importance to secure perfect and tranquil sleep, which is a good indication of the condition of the nervous system. If a man is in good health, purgatives, with which the training sometimes begins, are unnecessary. The bowels may be kept regular by varying the diet, and oat-meal gruel is frequently used with this end in view. Perfect action of the skin should be secured by proper ablutions after exercise. Fat may sometimes be removed from particular parts by local sweating with bandages. It is especially important to remove fat from the face and to harden the skin and subcutaneous cellular tissue, so that the "punishment" will not puff up the face, particularly about the eyes, which sometimes become closed by swelling under the blows of the

antagonist. A man is not in good condition unless the skin be bright, clear, and free from blotches or pimples. A constitutional taint, such as syphilis, usually shows itself during a course of severe training, and the man breaks down or "goes stale." The wind and endurance are developed by boxing and running. The man boxes with his trainer or strikes at the bag for several hours each day, and runs at a moderate pace from six to ten miles, doing a quarter or half of a mile at the top of his speed. This shakes the abdominal organs, promotes the removal of fat from the omentum, and gives play to the diaphragm, while at the same time it gives agility and power to the legs. The trainer should have his man under complete subjection, and never leave him, night or day, during the whole course of training. He learns, if possible, the points and style of fighting of his adversary, and generally fixes upon a plan of battle. He boxes with his man constantly, hits him hard, and accustoms him to bear punishment without loss of temper or judgment. His man should go into the ring confident that he will win the battle. For at least 24 hours immediately preceding the fight the man should rest. Many trainers bring down the weight of their men by diet and sweating below the point at which they are to fight, depressing the system somewhat at first, and then allow the weight to come up to the proper point, so that they fight when the system is at its maximum of reaction and in perfect condition. In the articles of agreement of a prize fight, the weight at which the men are to fight is usually stipulated. When no such stipulation is made, the men are said to fight at "catch weight," or at such weight as they may think proper. A man may fight at less than the stipulated weight, but he is ruled out if he is over weight. Pugilists are usually classed with regard to weight as follows: a man of 115 lbs. or under is called a feather weight; between 115 and 130 lbs., a light weight; between 130 and 150 lbs., a middle weight; at 150 lbs. or over, a heavy weight.—Boxing, which is practised for exercise and amusement and in training for a prize fight, is conducted according to the rules of the ring, and the hands are provided with gloves padded with hair on the back to the thickness of two or three inches, so that the blows are much less severe than with the naked fist. Glove fights are sometimes practised at public exhibitions in exact accordance with pugilistic rules, and these are frequently quite severe. Occasionally the gloves are blackened so as to leave a mark when a man is hit, each blow being counted by the judges. Boxing constitutes the greatest part of so-called pugilistic science, and different professors of the "manly art" usually have different methods or styles. The most important principles of boxing are as follows. The position is with the left foot forward, the feet separated 16 or 18 in. according to the size of the man. The

weight rests mainly upon the right leg, the left leg being free to advance. The body is erect, the head easily poised and erect, so that the movements are free, and the hands are placed at about the level of the upper part of the chest, with the fists closed and the arms slightly bent. The left hand is somewhat in advance of and lower than the right, and is used mainly for striking when the antagonist is just within distance. The right hand is used in guarding blows of the left and in close work. A boxer keeps his eyes constantly fixed upon the eyes of his opponent, ready to hit or guard when occasion offers. Sparring technically means the movements of the hands to and fro, which are constantly made when boxers are in position. The main point in striking a first blow, or "lead-off," is to deliver the blow without any "show" or warning, and so quickly that the opponent cannot defend himself. In boxing, feints are frequently made to direct the attention of the adversary from the place where the real blow is to be delivered. The blows of all good boxers are struck straight from the shoulder, and the most effective blows are those into which the whole weight of the body is thrown. It is not correct judgment to strike a blow unless the distance and position of the opponent be such that the blow will probably "get in." A "chopping" blow is one in which the fist is brought from above downward. This blow is frequently used by good boxers in returns, but is not a good blow as a lead-off. The great point in striking is to hit quickly, straight, and as hard as possible. One solid blow is worth a hundred light taps. Rounding blows are seldom if ever used by good boxers, as these are not efficient and they expose the person. The most efficient blows are about the face and neck, on the pit of the stomach, and over the lower ribs. All blows below the waist are foul. Blows are avoided by guarding, jumping back, dodging with the head, &c. Dodging the head is very useful, and is practised in making many of the so-called "points." A very slight movement of the arm upward in front of the face is sufficient to cause a powerful blow to glance off. A movement of the arm downward across the body wards off a body blow. In hitting, the large knuckles should strike, and the back of the hand should be turned downward. In real fights points are seldom used, and the practical work is done by plain hitting and guarding of the head and body. The "counter" is a very effective blow, as it meets the man while he is advancing. This is a great practical point with good boxers. The man watches his opponent closely, and when he thinks he is about to lead off he strikes, hoping that his blow will get in before that of his adversary. At the same time he endeavors to guard his adversary's blow. A plain counter is when both men strike at nearly the same instant, with corresponding hands. If a man be remarkably quick in countering, he often

demoralizes his adversary, who becomes afraid to make a full lead-off, under the apprehension of the counter blow. A man may counter either upon his opponent's head or body. In countering, the opponent's blow is sometimes avoided by dodging the head to one side. If the head be dodged backward, the force of the counter is lost, and the opponent may get in a severe blow in following up. When the opponent has received a heavy blow, it is well to follow up the advantage with close work and to keep the man moving, so that he has no time to recover himself. Close work, rapid blows at close quarters, or "fibbing," requires great skill and judgment. The blows in close work should always be straight, as they protect from the blows of the adversary. Such quick work, however, is a great strain on the wind and endurance. Right-hand work is very effective in close quarters. In making points the right hand is very useful. A man dodges his head to one side to avoid his opponent's lead-off with the left, and strikes his opponent with the right in the face (called a cross counter, because the right arm crosses the adversary's left), or he strikes his opponent in the body. Another point is to drop the head quickly under the arm of the opponent when he strikes, and to deliver blows right and left when the head is raised. Another point is to strike the opponent's left-hand blow aside with the palm of the left, and immediately strike with the right. Another is to strike the left-hand lead-off up with the left elbow, and strike immediately a chopping blow with the same hand ("peak and chop"). Numerous points such as those just mentioned are used, particularly in "fancy" boxing; but they can hardly be described clearly, even with the aid of illustration by drawings. Most of these "points" require great confidence, as the man advances to meet his opponent as he strikes, avoiding the blows mainly by dodging, or "head work." There is no such thing as boxing without a master. A good boxer must have great practice and must box with many different persons. Clinching, chancery, and throwing are fair, so long as a man does not grasp his opponent's legs; but these manœuvres are not often practised in friendly boxing with gloves. A man steps in with his left foot, throws his left arm around the neck or chest of his opponent, and tosses him backward, the buttocks being crossed. This is called the "cross-buttock throw." Another throw is to step in with the right foot, throw the right arm around the opponent's waist, and throw him over the hips (the "hip throw"). Many throws and trips are used in fighting, and each has its counter movement. Throwing in the ring differs from ordinary wrestling, as a man grasps his opponent wherever he can above the belt. The different kinds of chancery consist in rushing in when the opponent strikes, or in close quarters, and throwing either arm around his neck, striking him as hard and as

often as possible in this position. Each chan-
cery has its counter movement, by which a
man may sometimes extricate himself. The
"upper cut" is generally used in close quar-
ters. It consists in striking from below up-
ward with the back of either hand, hitting
the man under the chin or in the face, accord-
ing to his position. Some boxers take a posi-
tion occasionally with the right foot advanced,
instead of the left; but this position is not
considered good, and it is much more difficult,
with the right foot advanced, to protect the
body.—See Egan, "Boxiana, a Sketch of An-
cient and Modern Pugilism" (5 vols., London,
1818); Brandt, "Habet! A Short Treatise on
the Law of the Land as it affects Pugilism"
(London, 1857); "Fistiana" (24th ed., London,
1863); Maclaren, "Training, in Theory and
Practice" (London, 1866); Harrison, "Ath-
letic Training and Health" (London, 1869);
Flint, "Physiology of Man," vol. iii., p. 374
et seq. (New York, 1870); "The Slang Dic-
tionary" (London, 1870); and "American
Fistiana, from 1816 to 1873" (New York,
1874). "Bell's Life in London" contains ac-
counts of the most important English prize
fights, and Wilkes's "Spirit of the Times"
(New York) of English and American fights.
The "Spirit of the Times" for May 5, 1860,
contains a full account of the fight between
Heenan and Sayers.

PUGIN. **I.** Augustus, an English architectural
draughtsman of French extraction, born in
Normandy in 1769, died in London, Dec. 19,
1832. He made many architectural drawings
for engraving, but is best known by a series of
elaborate works on the Gothic architecture of
the middle ages. These comprise "Specimens
of Gothic Architecture selected from various
ancient Edifices in England," &c. (2 vols. fol.
and 4to, with 114 plates, 1821-'3), the descrip-
tions of which were written chiefly by E. J.
Wilson; "Architectural Illustrations of the
Buildings of London" (2 vols. 4to, 1824), and
"Specimens of the Architectural Antiquities
of Normandy," &c. (1825-'8), both published
in conjunction with John Britton the anti-
quary. He also prepared, with the assistance
of his son, "Gothic Ornaments selected from
various Buildings in England and France."

II. Augustin Welby Northmore, son of the pre-
ceding, born in London, March 1, 1812, died
at Ramsgate, Sept. 14, 1852. He designed or-
namental Gothic furniture and metal work,
and published "Designs for Gothic Furniture
in the Style of the 15th Century" (1835), "De-
signs for Iron and Brass Work in the Style of
the 15th and 16th Centuries" (1835), "De-
signs for Gold and Silversmiths' Work" (1836),
and "Ancient Timber Houses" (1836), all of
which had a material influence in promoting a
revival of the taste for Gothic forms. He also
published "Contrasts, or a Parallel between the
Noble Edifices of the 14th and 15th Centuries
and similar Buildings of the present Decay of
Taste" (2d ed., 1841). Becoming a convert to

the Roman Catholic faith, he devoted himself
to the study of ecclesiastical Gothic architec-
ture, and thereafter invariably declined to de-
sign for Protestant places of worship, and sel-
dom accepted commissions from Protestants.
The chief exceptions to this rule were the gate-
way to Magdalen college, Oxford, and the elab-
orate mediæval ornamentation of the new par-
liament houses. He purchased an estate at
Ramsgate, and erected a house, church, schools,
&c., all of which were dedicated to St. Augus-
tine. His chief publications besides those men-
tioned are: "Examples of Gothic Architecture"
(3 vols. 4to, 225 plates, 1838); "True Prin-
ciples of Pointed or Christian Architecture"
(1841); "An Apology for the Revival of
Christian Architecture" (1843); and "Glos-
sary of Ecclesiastical Ornament" (1844).—See
"Recollections of A. W. N. Pugin, and his
Father, Augustus Pugin, with Notices of their
Works," by Benjamin Ferrey, with an appen-
dix by E. Sheridan Purcell (1861), and "Pho-
tographs from 500 sketches by the younger
Pugin" (2 vols., 1865). **III.** Edwin Welby, an
English architect, son of the preceding, born
March 11, 1834, died in London, June 7, 1875.
He completed his father's unfinished works,
and designed hundreds of churches and other
public buildings in England and Ireland.
Among his works are the orphanages of Hel-
lingly and Bletchingly, the Carmelite church
at Kensington, and the cathedral at Queens-
town, near Cork, in conjunction with Mr.
Ashlin. In 1873 he was involved in a suit for
libel with the painter Millais.

PUJOL, Abel de. See ABEL DE PUJOL.

PULASKI, the name of counties in seven of
the United States. **I.** A S. W. county of Vir-
ginia, bordered E. partly by New river, which,
turning W., intersects it toward the south,
Little river, a branch of New, completing the
E. boundary; area, about 300 sq. m.; pop. in
1870, 6,538, of whom 1,809 were colored. It
lies between two mountain ranges, Walker
mountain on the northwest and the Blue Ridge
on the southeast. The surface is broken and
the soil generally fertile. The Atlantic, Mis-
sissippi, and Ohio railroad passes through it.
The chief productions in 1870 were 38,411
bushels of wheat, 96,690 of Indian corn, 27,-
301 of oats, 2,817 tons of hay, 18,580 lbs. of
tobacco, 9,605 of wool, and 53,100 of butter.
There were 1,104 horses, 1,147 milch cows,
4,169 other cattle, 2,018 sheep, and 4,347
swine. Capital, Newbern. **II.** A central
county of Georgia, intersected by the Ocmul-
gee and Little Ocmulgee rivers, and drained
by their branches; area, about 650 sq. m.;
pop. in 1870, 11,940, of whom 5,948 were
colored. It has a level surface toward the
south and rolling toward the north. The Ma-
con and Brunswick railroad and the Hawkins-
ville branch intersect it. The chief produc-
tions in 1870 were 215,375 bushels of Indian
corn, 13,646 of oats, 20,432 of sweet potatoes,
17,320 lbs. of butter, 15,444 of wool, and 6,617

bales of cotton. There were 855 horses, 940 mules and asses, 2,868 milch cows, 6,230 other cattle, 6,767 sheep, and 12,728 swine. Capital, Hawkinsville. **III.** A central county of Arkansas, intersected by the Arkansas river and drained by its branches; area, 1,200 sq. m.; pop. in 1870, 32,066, of whom 5,948 were colored. In the south the surface is level, and in the north and west hilly, and the soil is moderately fertile. Lead, slate, and excellent granite are found. It is intersected by the Memphis and Little Rock, the Little Rock and Fort Smith, and the Cairo and Fulton railroads. The chief productions in 1870 were 9,673 bushels of wheat, 516,519 of Indian corn, 16,442 of oats, 26,252 of Irish and 41,743 of sweet potatoes, 161,310 lbs. of butter, and 14,891 bales of cotton. There were 2,388 horses, 1,913 mules and asses, 4,341 milch cows, 5,514 other cattle, 2,288 sheep, and 24,977 swine; 2 manufactories of boots and shoes, 1 of carriages and wagons, 4 of clothing, 3 of furniture, 2 of iron castings, 2 of machinery, 2 of sash, doors, and blinds, 3 of tin, copper, and sheet-iron ware, 2 of cigars, 1 planing mill, and 10 saw mills. Capital, Little Rock, which is also the capital of the state. **IV.** A S. E. county of Kentucky, bordered S. by the Cumberland river, and E. by the Rock Castle; area, about 550 sq. m.; pop. in 1870, 17,670, of whom 1,075 were colored. It has a diversified surface, with several elevated ranges, and contains iron, lead, and coal. The chief productions in 1870 were 43,918 bushels of wheat, 466,379 of Indian corn, 176,016 of oats, 34,790 of Irish and 21,709 of sweet potatoes, 279,716 lbs. of butter, 37,341 of wool, 47,749 of tobacco, and 2,252 tons of hay. There were 4,354 horses, 1,187 mules and asses, 4,631 milch cows, 1,655 working oxen, 4,747 other cattle, 21,579 sheep, and 22,570 swine. Capital, Somerset. **V.** A N. W. county of Indiana, intersected by Tippecanoe river; area, 435 sq. m.; pop. in 1870, 7,801. It has a nearly level surface, about equally divided between prairie and oak openings, and a generally fertile soil. It is intersected by the Pittsburgh, Cincinnati, and St. Louis, and the Louisville, New Albany, and Chicago railroads. The chief productions in 1870 were 87,640 bushels of wheat, 12,035 of rye, 60,512 of Indian corn, 25,186 of oats, 50,102 of potatoes, 147,015 lbs. of butter, 22,266 of wool, and 14,442 tons of hay. There were 2,576 horses, 3,341 milch cows, 5,427 other cattle, 7,823 sheep, and 5,008 swine. Capital, Winamac. **VI.** A S. county of Illinois, separated from Kentucky by the Ohio river and bordered N. W. by Cache river; area, about 175 sq. m.; pop. in 1870, 8,752. It has a level and well wooded surface and a fertile soil. It is intersected by the Illinois Central and the Cairo and Vincennes railroads. The chief productions in 1870 were 44,922 bushels of wheat, 195,735 of Indian corn, 16,511 of oats, 24,652 of potatoes, and 157,000 lbs. of tobacco. There were 871 horses, 842 milch

cows, 1,736 other cattle, 1,380 sheep, and 5,715 swine. Capital, Mound City. **VII.** A S. county of Missouri, intersected by the Gasconade river and drained by several of its branches; area, 1,332 sq. m.; pop. in 1870, 4,714, of whom 25 were colored. The surface is hilly and the soil generally fertile. It is intersected by the Atlantic and Pacific railroad. The chief productions in 1870 were 28,037 bushels of wheat, 201,019 of Indian corn, 20,873 of oats, 9,020 lbs. of tobacco, 7,150 of wool, 75,580 of butter, and 6,052 gallons of sorghum molasses. There were 1,481 horses, 1,271 milch cows, 2,949 other cattle, 3,886 sheep, and 10,154 swine. Capital, Waynesville.

PULASKI, Casimir (Pol. KAZIMIERZ PULAWSKI), count, a Polish soldier, born in Lithuania, March 4, 1747, died from a wound received in the attack on Savannah, Oct. 11, 1779. He was the son of a Polish nobleman, the starosta of Wareck, who was the chief organizer of the confederation of Bar, which was signed by his three sons (1768). Casimir, who had acquired military experience in the service of Duke Charles of Courland, entered heartily into the war for the liberation of his country. Forced to cross the Dniester, he took refuge after the storming of Bar in the monastery of Berditchev with 300 men, and after sustaining a siege of several weeks capitulated on the condition that the garrison should be set at liberty. He himself was not freed until he had pledged himself to bear proposals for a reconciliation to the chiefs of the confederates; but as soon as he was set at liberty he refused to keep a promise extorted by force. Joining his father in Moldavia, he made incursions across the Dniester, and attacked the Russians and fortified posts within the Polish borders. He carried on a desultory warfare in various parts of the country, until an unsuccessful attempt to gain possession of the person of King Stanislas Augustus, in 1771, caused a sentence of outlawry and death to be passed against him, on the ground that it was his intention to assassinate the monarch. The coalition of Austria, Russia, and Prussia for the conquest and division of Poland was soon after completed, and resistance became hopeless. Pulaski, who had lost his father and brothers in the war, made his way to Turkey, and afterward went to France, where he offered his services in the American cause to Franklin. With high recommendations to Washington he arrived at Philadelphia in the summer of 1777. He at first served in the army as a volunteer; but four days after the battle of Brandywine, in which he distinguished himself, he was appointed by congress commander of the cavalry with the rank of brigadier general. After five months he resigned his command, and entered the main army at Valley Forge in March, 1778, where he proposed to organize an independent corps of cavalry and light infantry, to which congress assented. By October 330 men were in this corps, which was called Pu-

laski's legion. With this he marched, in February, 1779, to South Carolina, reached Charleston May 8, and vigorously opposed the project of surrendering the place to the British army then before the city. On May 11 he attacked with his legion the British advance guard, and was repulsed with considerable loss in killed, wounded, and prisoners, he himself escaping with difficulty to the American lines. In September the French under Count d'Estaing and the Americans prepared to besiege Savannah. On Oct. 9 it was determined to carry the town by assault. Pulaski was placed at the head of the French and American cavalry, and during the engagement received a mortal wound. He was taken on board the brig *Wasp*, which lay in the Savannah river, died after lingering two days, and was buried in the river. A monument to his memory voted by congress has never been erected, but one was raised by the citizens of Georgia in Savannah.

PULCI, Luigi, an Italian poet, born in Florence in 1431, died there in 1487. He held an inferior office under the republic, and was one of those for whom Lorenzo de' Medici kept a place at his table. His *Morgante Maggiore*, treating the legend of Charlemagne and his paladins, was first published in Florence in 1481. One canto of it was translated into English by Lord Byron. Pulci also wrote sonnets and other short pieces.

PULKOVA. See OBSERVATORY.

PULLEY. See MECHANICS, vol. xi., p. 327.

PULMONARIA. See LUNGWORT.

PULQUE, an aboriginal Mexican name for the fermented juice of *agave Americana*, the American aloe, maguey, or century plant (see AGAVE), which is cultivated in southern Mexico, as well as in Central and South America, for this and other products. The plant cannot be utilized for pulque until it has completed its growth and is about to flower, a time which varies with the soil and location from 5 to 15 years. The sap stored up in the long and very fleshy leaves for the rapid development of the flower stalk abounds in sugar and mucilage. As soon as there are indications of the shooting up of a flower stalk from the centre of the plant, the central leaves and forming bud are cut out, a cavity being formed in their place, into which the sap will flow; the cavity is shaded by drawing over some of the outer leaves and tying their points. A vigorous plant will yield about two gallons a day for four or five months; as it quickly ferments, the juice is gathered from the plant three times a day in earthen jars, which are emptied into reservoirs made of raw hide tacked to a wooden frame. A portion of the juice is disposed of as pulque, *i. e.*, simply fermented, while the greater part is distilled to form a strong alcoholic liquor, called pulque brandy, aguardiente, mezcal, and by other names. Pulque is a favorite drink with the Mexicans, and in the towns is sold in the market places and at shops called *pulquerias*,

where the strong liquor is also kept. Taken in an early stage of fermentation, when the liquid is brisk with the bubbles of carbonic acid that are given off, pulque is a pleasant drink, not unlike spruce beer; but if allowed to complete its fermentation, which it does in three or four days, and reach the condition in which Mexicans like it best, no uneducated stomach can tolerate it; it contracts the odor of putrid animal matter from the skin in which it is fermented, and is exceedingly repulsive. Among the Mexicans the pulque from certain localities or plantations is especially esteemed, as among Europeans preference is given to the wine of certain vineyards. When the flow of sap ceases, the plant dies, but not without having formed innumerable offsets by means of which the plantation may be renewed.

PULSATILLA. See ANEMONE.

PULSE (Lat. *pulsare*, to beat), the throbbing of the arteries caused by the intermitting impulses communicated to the blood by the heart's contractions, propagated as a wave by the elasticity of the arteries, perceptible to the touch in all but the smallest vessels, and visible when they are superficial or exposed; the pulsation being nearly synchronous with the contraction of the left ventricle. At each pulsation the capacity of the artery is augmented by an increase of diameter and by a partial elongation, the vessel being thereby lifted from its bed; this increase has been estimated for the carotid artery as $\frac{1}{3}$ part, but this can be only an approximation. The pulsation of the larger arteries in the immediate neighborhood of the chest, as for example the carotids, is perceptibly synchronous with that of the heart; but for those at a distance, a slight interval of time is required for its propagation. Thus the pulse of the radial artery at the wrist is sensibly later than that of the heart, and that of the posterior tibial artery, at the ankle joint, later still. But this interval in each instance is very short, and requires careful attention to be distinguished. The pulse is liable to vary, within the limits of health, from the diversities of age, sex, stature, muscular exertion, condition of the mind, state of the digestive process, and period of the day. The following table is given by Carpenter as an approximation to the average frequency of the pulse per minute at different ages:

In the fetus.....	140 to 150
Newly born infant.....	130 to 140
During the 1st year.....	115 to 130
" " 2d ".....	100 to 115
" " 3d ".....	95 to 105
" " 7th to 14th year.....	80 to 90
" " 14th to 21st ".....	75 to 85
" " 21st to 60th ".....	70 to 75
In old age.....	75 to 80

According to Dr. Guy, the pulse of the adult female usually exceeds that of the adult male of the same age by 10 to 14 beats a minute; according to Volkmann, the pulse is less frequent as the stature is greater, about four beats for half a foot in height. It is well known

that muscular exertion increases the frequency of the pulse. The effect of posture has thus been expressed by Dr. Guy:

Average beats per minute in	Standing.	Sitting.	Lying.
Healthy males.....	81	71	66
Healthy females.....	91	84	79

According to this, the difference between standing and lying in the former is one fifth of the whole, in the latter one eighth; when this change is effected by muscular effort the variation is greater, accounting for many cases of sudden death in persons with disease of the heart or in very weak conditions on quickly assuming an erect position. Mental excitement, the digestive process, alcoholic drinks, and elevation above the sea level, accelerate the pulse; as a general rule, though with numerous exceptions, it is more frequent in the morning than in the evening, and in sanguine than in lymphatic temperaments. The pulse is slower during sleep, and from the effect of rest, diet, cold, venesection, and the action of many drugs, especially digitalis, aconite, and hellebore. The pulse may be counted in any artery, and in a manner familiar to all, but most conveniently in the radial at the wrist, in the carotids, temporals, brachial, or femoral. The average numerical proportion of the arterial pulsations to the respiratory movements is 4 or 5 to 1; when this proportion is widely departed from, there is either some general diseased condition of the system accompanied with fever, some obstruction to the proper aëration of the blood, or some disorder in the nervous system; in inflammatory or acute diseases, the pulse may rise to 120 and 160 in the adult, and so that it cannot be counted in the child; in pneumonia, with the quickened pulse the number of respirations increases more rapidly, the above proportion becoming as 3 or even 2 to 1; in hysteria a similar increase may occur in both without any serious cause.—The exact form of the arterial pulse has been determined by means of a contrivance termed the "sphygmograph," which consists of a small metallic or ivory plate, held in contact with the integument immediately over the vessel by means of a delicate spring, and lifted from its bed by each pulsation of the artery. The plate carries an upright rod, which in its turn moves a long but light index, the end of which traces an alternately ascending and descending line upon the surface of a strip of paper moving with uniform velocity. Thus the extent of the vertical motion measures the width of the arterial expansion; and its greater or less obliquity, as traced upon the paper, indicates its rapidity or slowness, as compared with the horizontal movement of the paper itself. Such a trace is very useful, first by showing minute peculiarities of the arterial pulsation, too small to be distinctly perceptible by the touch; and sec-

ondly, by leaving them in the form of a permanent record, suitable for subsequent study and comparison. The ordinary trace of the radial pulse, taken in this way, consists of a nearly vertical ascending line, which indicates the sudden and rapid expansion of the artery, followed by an oblique and somewhat undulating descent, showing the comparatively slower and more irregular collapse of the vessel. These two ascending and descending lines are repeated for every pulsation of the artery.

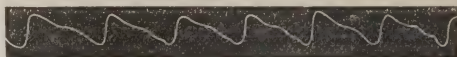


FIG. 1.—Trace of the Radial Pulse, taken by the Sphygmograph.

Sometimes the undulations of the descending line become more perceptible, owing to an increase of temperature or some other cause which diminishes the resistance of the arterial walls to the heart's impulse; and under these circumstances the expansion of the vessel is more sudden and vertical, while its collapse is indicated by one or two well marked oscillations, in the trace of the descending line. In

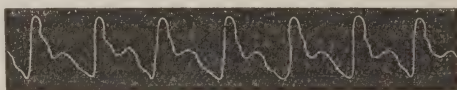


FIG. 2.—Trace of the Radial Pulse under the influence of Increased Temperature.

certain cases of disease this oscillation of the artery at the period of collapse becomes so marked that a sort of secondary beat, or reduplication of the pulse, is perceptible even to the touch; and this constitutes what is known as the double or dicrotic pulse, in which there are two perceptible pulsations of the artery for every contraction of the heart. Of these two

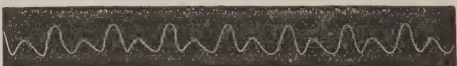


FIG. 3.—Trace of a Dicrotic Pulse, in Typhoid Fever.

pulsations, only the first is directly caused by the impulse of the heart; the second is due to the oscillation of the blood in the relaxed arterial tube. Dr. E. R. Hun, who at that time was special pathologist to the New York state lunatic asylum at Utica, published in the "American Journal of Insanity" for January, 1870, the results of a series of investigations, in which he found that the pulse of the insane "always tends toward the dicrotic or mono-



FIG. 4.—Trace of Pulse in Dementia.

crotic type, being never tri-crotic in uncomplicated cases. It becomes more characteristic as the mental condition degenerates, and assumes

its typical form in the most profound state of dementia," as shown in the following sphygmographic tracing of the pulse of a patient 37 years of age. The trace given in fig. 5 shows a marked dirotic form in a patient having slight symptoms of mania. This became ir-

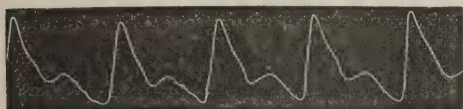


FIG. 5.—Trace of Dirotic Pulse in Mania.

regularly trirotic under excitement, and more regular after an outburst of excitement.—Usually the pulsating movement of the blood is not continued into the capillary vessels; but when the arteries are dilated in the glandular organs at the time of their increased functional activity, the pulsation is communicated to the capillaries, and even through them to the veins. This condition, however, lasts only during the period of increased vascular excitement; and as it subsides, the movement of the blood in the capillaries again becomes uniform, and the pulsation is limited as before to the arterial system.

PULTENEY, William, earl of Bath, an English statesman, born in 1682, died in London, July 8, 1764. He was educated at Westminster school and at Christ Church, Oxford, travelled on the continent, and in 1705 became member of parliament for the borough of Hedon in Yorkshire. This position he owed to his guardian, Henry Guy, who subsequently left him a legacy of £40,000 and landed estate to the amount of £500 a year. He acted as a whig throughout the reign of Queen Anne, participated in the prosecution of Sacheverell, and defended Walpole in the prosecution against him in 1712. When that minister resigned in 1717, Pulteney gave up his office of secretary at war, to which he had been appointed on the accession of George I. When Walpole resumed office in 1720, Pulteney was appointed cofferer of the household; but he went over to the opposition in 1725, was dismissed from his office, and became one of the most bitter enemies of the minister. He allied himself with Bolingbroke, and published pamphlets in which he attacked the ministry so virulently as to bring about a duel in 1731 between himself and Lord Hervey, in which both were slightly wounded. Through the brilliancy of his speeches, and his patriotic sentiments, he became the most popular man in the nation; and in 1742, when Walpole was driven from power, Pulteney constructed a new cabinet with the earl of Wilmington at its head, in which he took a seat, but without office, and accepted a peerage. The administration satisfied neither the people nor his partisans. Pulteney lost his popularity, and, as Chesterfield wrote, "shrunk into insignificance and an earldom." In 1746 the Pelham ministry resigned, and Pulteney became

premier; but he had so little influence that he was unable to obtain the assistance of any men of importance, and he held office only two days. In 1760 he published "A Letter to Two Great Men" (Pitt and the duke of Newcastle). As his only son had died before him, the peerage in his family became extinct.

PULTOCK, Robert, an English author, whose only known work is "The Life and Adventures of Peter Wilkins" (London, 1750), which describes an imaginary race of flying islanders in the South Pacific. The name of the author was unknown till 1835, when, at a sale of books and manuscripts which had belonged to Dodsley the publisher, the original agreement for the copyright of the book was found, in which Pultock is described as "of Clement's Inn, gentleman." He sold his story for £20, with 12 copies of the work, and a set of the first impressions of the engravings.

PULTOWA. See **POLTAVA**.

PUMA. See **COUGUAR**.

PUMICE. See **OBSIDIAN** and **PUMICE**.

PUMP, a machine for raising liquids in pipes, either by direct action or by atmospheric pressure, and also for exhausting air from vessels. (See **AIR PUMP**.) The history of the hydraulic pump cannot be clearly traced. Methods of raising water by wheels with buckets attached to their peripheries, and also by means of endless ropes moved by two drum wheels, were used by the ancient Egyptians and Assyrians; and the chain pump was probably derived from the Chinese, or at least was first used by them. But there is no evidence of the employment of a valve pump until near the commencement of the Christian era, although a machine resembling a portable pump is often represented in ancient Egyptian sculptures. Vitruvius ascribes the invention of the valve pump to Ctesibius of Alexandria, who probably lived in the latter part of the 3d century B. C. The water pump of Ctesibius was described by Heron, who flourished in the same century. It consisted of two single-acting solid-headed pistons moving up and down in two vertical cylinders with lift valves at the bottom, and a branch pipe with an outgoing valve placed between the piston and the lower valve, and was very much like the simple force pump of the present day. The motive power in large machines was an undershot paddle wheel. The employment of a valve in the piston head, and placing this below the discharge pipe, so as to constitute a lift pump, was probably of later date.—According to the manner in which pumps act, they may be divided into vacuum and force pumps; but it is more common to divide them into the force pump, the common suction pump, the lift pump, and the suction and force pump combined. The power may be applied by a piston moving to and fro in a cylinder, or by a wheel revolving in a box. Rotary pumps, in which the latter method is used, may be simply force pumps or suction and force pumps, the power being applied by direct

pressure or by centrifugal force. It is usual to denominate them rotary force pumps and centrifugal pumps. The cylinder and piston pump will be described first.—*The Force Pump.* It is probable, as has been intimated,

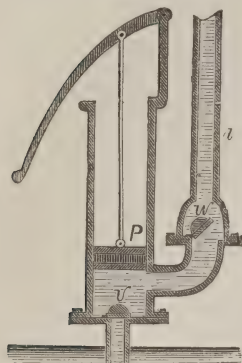


FIG. 1.—Force Pump.

that the earliest valve pump was a force pump, and was similar in construction and action to that shown in fig. 1 when the lower valve *v* is immersed in the reservoir, so that exhaustion, suction, or atmospheric pressure has no essential connection with its working. When the piston *P* is raised, water will rush into the chamber through *v*, and when the piston is depressed this valve will close, while the valve *w* will be raised by the water, which is forced up into the pipe *d*. Upon raising the piston again, the pressure being removed from beneath the valve *w*, the weight of water above will cause it to close and thus prevent any return. But water from external pressure will again rush through the valve *v*, and the descending piston will again force it up through the valve *w* into the discharge pipe. The operation may be continued until there is enough water in the pipe *d* to exert a pressure per square inch equal to that exerted by the propelling power upon each square inch of the piston head.—*The Common Suction Pump.* The functions of this pump depend upon the relative pressure of a column of water within the pipe and that

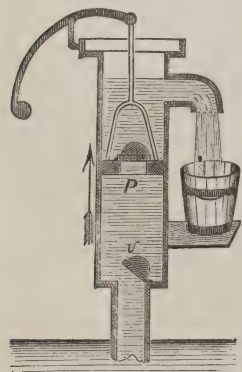


FIG. 2.—Common Suction Pump.

of the atmospheric pressure upon the water outside of it. At the level of the sea the pressure of the atmosphere, when water boils at 212° F., is equal to sustaining a column of mercury of 29·922 in. when at a temperature of 60°. (See *BOILING POINT*.) The atmospheric pressure is therefore capable of sustaining, under the same conditions, a column of water 33·8 ft. high,

in water and the tube completely exhausted of air, the water will rise to a height of 33·8 ft. above its level in the reservoir. The action of the common suction pump, fig. 2, will be easily understood from a consideration of this fact. The piston *P*, fitting the cylinder air-tight, on being raised will expand the air beneath it, and therefore diminish its pressure upon the water in the pipe beneath, according to the law of Boyle or Mariotte. (See *PNEUMATICS*.) When the piston is depressed the lower valve *v* will shut in consequence of the pressure being greater above than below, and the valve in the piston, opening upward, will open when the density of the air in the cylinder becomes greater than that of the external air, and its contents will thus be expelled. Succeeding motions of the piston will thus continue to exhaust the air within the pipe until the pressure of the air on the water in the reservoir is sufficient to force the water in the pump up to the lower or suction valve. If the exhaustion is complete the water will rise to a height of 33·8 ft. This effect can be secured by filling the pump with water at the top before commencing. Now, as a column of water 33·8 ft. high ordinarily measures the extent of the pressure of the atmosphere at the level of the sea, it follows that if the suction valve is placed at a greater distance above the water in the reservoir the pump will not work. At an elevation, as upon the side or top of a mountain, the atmospheric pressure being less, the valve must be placed lower. At a height of 15,700 ft., where water boils at about 186° and the barometer stands at about 17·5 inches, the lower valve requires to be within 19·7 ft. above the level of the water in the reservoir, this being the height of a column of water which will balance the atmospheric column.—*The Lift Pump.* By a slight change in the form of the suction pump, and the addition of a valve at *x*, fig. 3, the modern form of the lift pump is produced, and the water may be raised to a height corresponding to the amount of power applied. The form shown in this figure is that of a lift and suction pump combined. Removing the lower valve *v*, and immersing the pump till the valve *w* in the piston is below the surface of the external water, the machine becomes simply a lift pump. The suction pump is also often called a lift pump. A form which is often figured in books employs an exterior frame supporting a piston rod which enters the pump at the lower end, pushing the piston

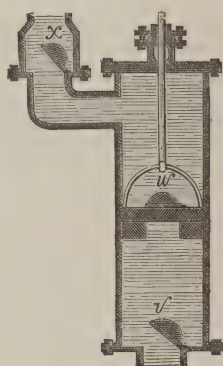


FIG. 3.—Lift Pump.

or a little more than 13½ times as high as the column of mercury, the specific gravity of the fluid metal being 13·557 at 62·6° F. (See *MERCURY*.) Consequently, if the lower end of a vertical tube of sufficient length is immersed

up instead of raising it through a packed box at the top of the cylinder. Such were the old pumps used by Rannequin in the water works at Marli, and by Lintlaer in the engines erected during the reign of Henry IV. at the Pont

Neuf, to supply the Louvre from the Seine. The lift pump is in fact another kind of force pump, and in its simplest form may have been one of the first employed. The efficiency of the force pump, as well as of the lift pump, may be greatly increased by the employment of an air chamber, as shown in fig. 4, by which means a constant and equable flow is secured and the sudden

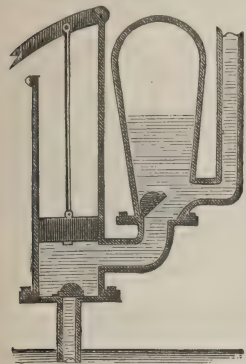


FIG. 4.—Force Pump with Air Chamber.

shock of reaction avoided. A dome-shaped vessel is placed in the course of the discharge pipe, a short distance beyond the upper valve. When the water in the discharge pipe is raised to a height of 33·8 ft. above the level of the water in the air chamber, the latter will of course be half filled with water, the air being compressed to one half its original volume by the double pressure of water and atmospheric air upon it. It may be remarked that, as in the case of the hydraulic ram, the air in the chamber becomes gradually absorbed by the water as it passes through the pump, and must from time to time be replaced. The discharge pipe, instead of branching off from the base of the air chamber, may pass directly into it through a hole in the dome, and down to near the base. In either case the air chamber is replenished by allowing the water to run off by a cock at its base. A double-acting force pump is shown in fig. 5. This possesses the advantage of producing a more uninterrupted stream than the form shown in fig. 1, and if supplied with an air chamber the latter need

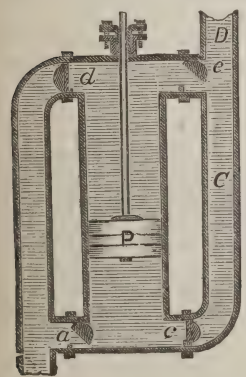


FIG. 5.—Double-Acting Force Pump.

not be so large to effect the same equalization of current. Double-acting force pumps, either with or without the air chamber, are often employed at large town water works for raising water to the distributing reservoirs.

Such a pump acts as follows. When the solid piston head P descends, the valves *a* and *e* are forced shut, while *d* and *c* are opened, water entering behind the piston through *d* and being forced in front of it through *c*, and up the pipe CD. When the piston is raised the position of the valves is reversed,

the water entering through *a* and being forced out through *e*. This is the position shown in the figure. When water is to be raised to a great height or against great resistance, as in the hydrostatic or hydraulic press, a plunger in place of the ordinary piston with packed head is used, which passes through a tightly packed box, as shown in fig. 6. Such plunger pumps were employed in the water works at York buildings, London,

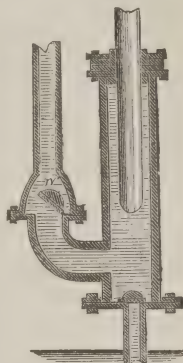


FIG. 6.—Plunger Pump.

in the last century, but they are described in Commandine's translation of Heron's *Spiritalia*. It is evident that the introduction of the plunger into the cylinder must expel an equal volume of water through the upper valve, and on being withdrawn allow the entrance of the same quantity through the lower valve. The fire engine is a combination of two force pumps, as shown in fig. 7, the water being forced from each into the common air chamber A, and so on through the discharge pipe E, to which may be attached the hose. The power applied as a motor may be various, as that of man, of animals, of water, or of steam. The earliest application of a steam engine to a pump was by Newcomen in 1713. The contrivance of Savary can hardly be called an application of a steam engine to a pump, because the steam cylinder was a part of the pump itself, the steam performing the functions of a piston head. Very large pumps are often used for drainage purposes, which are usually worked by steam engines separate from the pump itself. An enormous steam engine was employed in the drainage of Haarlem lake in Holland, which

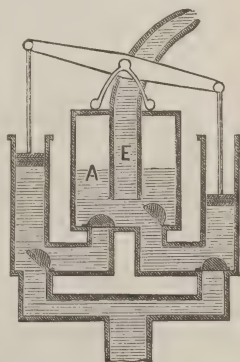


FIG. 7.—Fire Engine.

drove ten pumps having a united capacity of raising 112 tons of water at each stroke. (See DRAINAGE.) Large pumps are used for raising water into reservoirs for supplying cities. (See WATER WORKS.) Most modern pumps

of moderate size which are driven by steam are known as direct-acting steam pumps; that is, there is no intervention of rotary motion, the reciprocating motion not being caused by the action of an eccentric, and the dead points or centres are avoided by the use of what is called an auxiliary valve. A good steam pump of this kind, constructed by the "Knowles Steam Pump Works" of Warren, Mass., a company owning the patent for the auxiliary valve, is shown in fig. 8. The auxiliary valve, A, moves back and forth within the steam chest, and it also has a slight rotary motion by which the ports at each end are opened and shut to produce reciprocating motion. When steam is admitted into the steam chest, it enters the valve A at the middle portion and passes out at one of the ports of the main flat valve v , this valve being moved over its seat by the motion of the auxiliary valve, through the medium of the stem S, which plays in a slot wide enough to admit of the slight rotation of the auxiliary valve. Now, when the steam enters the cylinder C, we will suppose upon the left, the piston is driven in the direction G D. This carries the standard F in the same direction. In the top of this standard there is a hole which slides over the rod $d' d''$, upon which there are two cams, w and o . When the top of the standard strikes one of these, it pushes the rod $d' d''$ which is attached to the auxiliary valve A in one direction, and also rotates it sufficiently to reverse the ports in the steam chest. The main valve v is therefore reversed and steam is admitted upon the other side of the piston head, by which means the standard F is moved in the direction opposite to its previous one, so that it will strike the opposite cam and cause

into French mines by Belidor in 1739, and is described in his *Architecture hydraulique*. It consists of two cylinders, a larger, C, fig. 9, and a smaller, D, with a piston in each, connected by a common rod. A supply pipe, A, conveys the descending column from its source

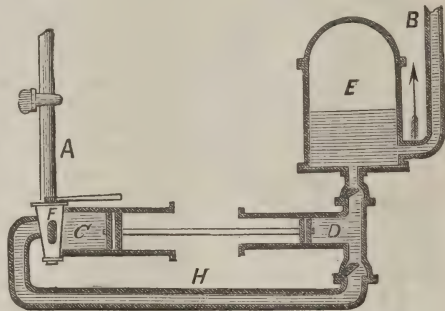


FIG. 9.—Hydraulic Pressure Engine, from Belidor.

to the three-way cock F, the air chamber E and the pipe B being the way of exit for that portion of the water which is raised. When the water from A enters the way leading into C, the piston in this cylinder, having, we will suppose, twice the area of cross section as the one in D, will force the water from the latter up the pipe B at each stroke until it has twice the elevation of the source supplying A. The three-way cock is so arranged that the pipe A is connected with the cylinder C or with the pipe H, and through it with the cylinder D by means of connections between the piston rod and a set of levers. When the piston in C returns toward F, an opening at one side of the three-way cock allows the water to escape,

the opening being closed when the piston begins to move in the direction of D. A portion of the water therefore runs to waste, a necessary result of the laws of mechanics.—*Rotary Pumps*. These are of two kinds, force pumps proper and centrifugal pumps. One of the oldest forms of rotary force pumps of which there is an account was contained in a collection of old models by Servière, born at Lyons in 1593. It consists of two cog wheels within an elliptical box, fitting accurately, as shown in fig. 10. It will be readily seen that the water must be propelled in the direction taken by the cogs which are in contact with the box. The cogs, fitting to each other accurately in the centre of the box, prevent the return of water, and the machine

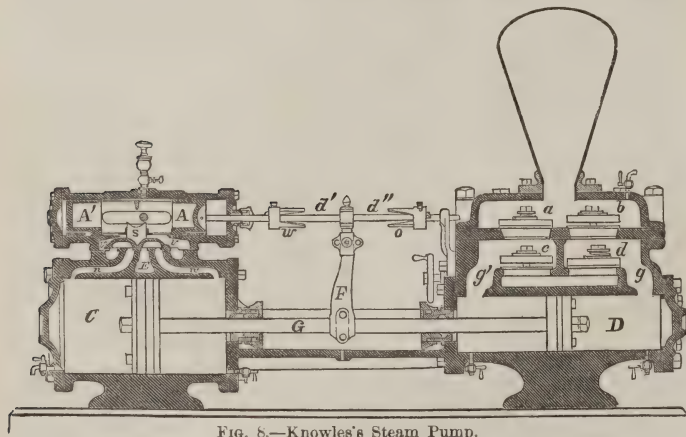


FIG. 8.—Knowles's Steam Pump.

the rod $d' d''$ to move forward and rotate and again reverse the auxiliary valve A. The pump is simply a double-acting force pump with an air chamber, and its action needs no special explanation. A force pump called a hydraulic pressure engine was devised and introduced

becomes both a force and a suction pump. When accurately made and used only in clear water, it is quite an efficient machine, and has since been employed as a form of rotary steam engine. It could not be used to raise water containing gravel or much solid matter. An-



Fig. 10.—Rotary Pump from Servière's collection.

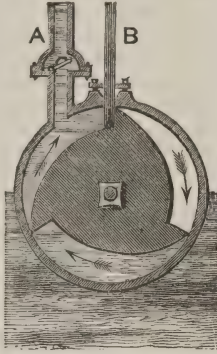


Fig. 11.—Rotary Pump of 16th century.

other old form of rotary pump of the 16th century is shown in fig. 11. A wheel of a diameter and thickness proportional to the capacity of the pump has its periphery formed into three cams, which give space for the passage of water between them and the inner surface of the cylindrical box in which it moves, and also raise and drop a broad sliding vertical bar, B (seen edgewise), which acts as a shut-off to the passage of the water within the box, directing it into the pipe A. The cams act the part of pistons, the water entering at the bottom of the cylinder and being forced in the direction of the arrows. To prevent its return on stopping the pump, a lift valve is placed in the discharge pipe, which shuts when the pressure above exceeds that below it. There are many other and recent forms of rotary force pumps, acting much upon the same principles, with the addition of devices which se-

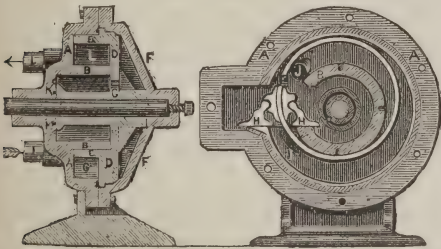


Fig. 12.

Fig. 13.

Bagley and Sewall's Rotary Pump.

cure greater efficiency. One of the latest of these is Bagley and Sewall's, patented by L. D. Green, of which fig. 12 is a vertical longitudinal, and fig. 13 a transverse section. A is the main case, made in one piece, and having attached the ring B, seen in both sections. The

space outside of B is the water space. This cylinder is enclosed by the disk D, which is attached to the shaft. An eccentric ring, E, is attached to the disk D so that in revolving its outer surface touches the inside of the case A, while the interior surface upon the opposite side of the ring touches the outside of the ring B. The eccentric ring E acts as the piston of the pump. The suction and discharge are respectively shown in both sections at I and J, the direction of the water being indicated in fig. 12 by the arrows. The parts are separated by the sliding valve H H, which is moved back and forth on its seat by means of two tumblers shown in fig. 13 between H and H. These tumblers are moved by the eccentric ring E, which passes between them. The centre ring B is made enough deeper than the casing A, as shown in fig. 12, to equalize the quantity of water within and without the eccentric piston ring E. F is the cover or outside case, and contains a closed bearing for the end of the shaft. The inner part of the disk D forms a collar G to the shaft, and by means of a screw at the end this collar can be forced tightly against its seat K, thus avoiding the use of packing. In the centre of the seat there is a circular groove, shown in section at K K, which connects by a drilled channel with the suction part. Any tendency to escape of water at the seat by pressure is thus overcome by vacuum force.—The chain pump consists of an endless chain carrying cups or disks around two drums, one beneath the surface of the water in the well or stream, and the other at a convenient elevation. The ascending part of the chain passes through a pipe just large enough to allow the cups or disks, which act as pistons, to move with little friction. It will thus be seen that the chain pump is little else

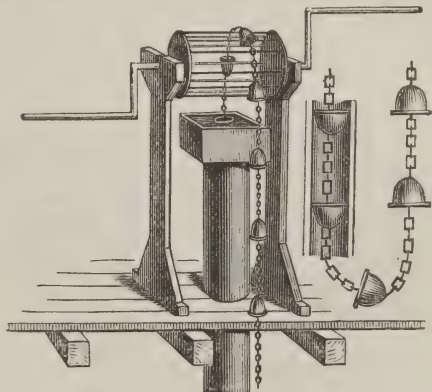


Fig. 14.—Old French Chain Pump.

than a modified form of rotary pump. When the water is to be raised to a moderate height, it often becomes a convenient and useful machine. Fig. 14 shows the form of an old French chain pump used in the ship yards at Marseilles, described by Belidor. It was worked

by two galley slaves, who were relieved every hour. It is uncertain where the chain pump originated, but it was probably first used in China in the form of an inclined trough with drums at either end, giving motion to a chain or rope with scoops or blocks attached.—The centrifugal pump is a machine which acts upon an entirely different principle from that of any pump so far described. The force which elevates the water is the centrifugal force developed by the revolution of a fan

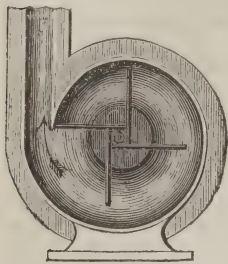


FIG. 15.—Massachusetts Pump.

wheel. An early efficient form of centrifugal pumps was constructed in Massachusetts in 1818, and called the Massachusetts pump. It resembles an ordinary fan blower, as will be seen by the cut, fig. 15. It consists of a horizontal shaft to which are attached four eccentric blades, narrowed toward their extremities and located within a cylindrical-shaped box, from which a discharge pipe F passes upward. The water is received at the centre, around the shaft, which is so placed that the blades just graze the inner surface of the box at the junction of the discharge pipe, into which the water is necessarily forced. The apparatus is placed below the level of the water, as the vacuum power is small. A more recent form of centrifugal pump is Appold's, shown in figs. 16 and 17, which was first exhibited at the world's fair in London in 1851. The efficiency of a centrifugal pump depends upon the form of its blades, and Mr. Appold made a great improvement, nearly doubling the efficiency of the Massachusetts pump, by giving them the form shown in section by the dotted lines in fig. 17. The revolving fan wheel, shown in fig. 16 at c, is fixed

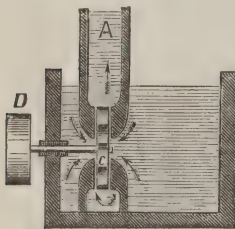


FIG. 16.

Appold's Centrifugal Pump.



FIG. 17.

to the end of a shaft turned by the drum D. It plays between two circular checks, through the centre of both of which there is a circular opening to admit the water from the reservoir, beneath the level of which the wheel is placed. The water enters at the central part of the fan, as shown in section in fig. 16 by the four curved arrows, two on either side,

the whole being rotated in the contrary direction. The lower part of the discharge pipe is enlarged into a drum somewhat similar to that of the Massachusetts and of the Gwynne pump, and the water issues from all parts of the periphery of the fan wheel and is forced upward into the discharge pipe A. Calculations have been made as to the height to which water may be carried with one of these pumps, but they do not possess much practical value, as the power of each machine varies with its construction; and 20 ft. is the practical limit, although by means of a very high velocity, not practicable for ordinary use, a height of 50 ft. has been reached. Gwynne and co.'s centrifugal pump is a modification of Appold's, and was shown at the same exhibition. A sectional view is given in fig. 18. Six equidistant arms, extending first in the direction of radii, but toward their outer ends curved and pointing backward as regards the direction of rotation, are fixed within a drum, which again moves within an outer drum.

The water enters at the centre, and taking the course of the arrows ascends the discharge pipe. Three of the arms commence at the axis, but the other three, alternating, commence at the circle of admission. The two drums are only in contact at a small ring surrounding the central opening. The arms diminish in breadth toward their outer extremities

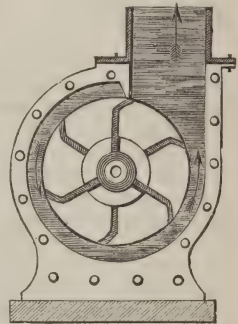


FIG. 18.—Gwynne's Centrifugal Pump.

to render the flow of water smooth, as the increase of centrifugal force at the periphery causes an increase in the velocity of the water, and therefore it requires a less space through which to move.—There are numerous practical points about the different kinds of pumps, to mention which would require a too extended detail. It may be remarked that a pump is one of the most difficult machines to keep in order. It is exposed, if not constantly in use, to great changes of moisture and dryness, and its metallic parts, particularly if of iron, soon become rusty. It is often convenient to have valves partly made of leather, but these cannot be expected to last long; if constantly in use they soon wear out, and if they are allowed to become dry they shrink and cease to perform their offices well.—A kind of steam pump without a piston, called a "pulsometer," is the invention of Mr. C. H. Hall of New York. It consists of two long-necked chambers joined together at the top, where a ball valve by falling one way or the other opens one of the chambers to the admission of steam. The water is admitted at the bottom of the chambers, and passes into

them alternately through two openings, which are also opened and closed by ball valves, the alternate expansion and condensation of steam in the chambers causing the movements. A delivery passage, common to both chambers, is also provided with a ball valve, which oscillates from side to side as the lower valves alternately open and close. It is claimed to be peculiarly adapted to pumping water from mines, from its not being liable to get out of order, working very well, it is said, when the water contains grit and mud.—Pumps for ships, mines, and submarine excavations, from their liability to become obstructed with solid substances or corroded with salt water, should be selected with especial reference to the difficulties met with in each case. The valves should be constructed in such a manner that they will not be liable to become clogged, and, when they are so, can be easily reached and cleaned.—For a further description of pumps and water engines, see Ewbank's "Hydraulics" (new ed., New York, 1863), the report on the Paris universal exposition of 1867 by F. A. P. Barnard, LL. D. (New York, 1869), and Spon's "Dictionary of Engineering" (London, 1874).

PUMPELLY, Raphael, an American metallurgist, born at Owego, N. Y., Sept. 8, 1837. He studied for several years in Hanover, Paris, and Freiberg in Saxony, returning home in 1860. He afterward engaged in mining and smelting operations in Arizona and other territories, and was employed by the Japanese government to explore the mineral resources of the island of Yezo, and by the Chinese government to survey the coal fields of northern China. In 1866 he was appointed professor of mining engineering in Harvard university, in 1870-'71 had charge of the state geological survey of the copper district of Michigan, and in 1871 was appointed state geologist of Missouri, which post he resigned in 1873. He has published "Across America and Asia" (New York, 1870); "Geological Survey of Missouri, Preliminary Report," with an atlas and plates (1873); "Geological Survey of Michigan," vol. i., part 2, "Copper District," with atlas (1873); and various monographs in scientific journals.

PUMPKIN (formerly written pompion, from the old French *pompon*; Gr. *πέπων*), the plant and fruit of *cucurbita pepo*, an annual plant of the natural order *cucurbitaceæ* or gourd family, for the characters of which see **GOURD**. The genus *cucurbita* has large yellow flowers, with a bell-shaped or short funnel-formed, five-cleft corolla, its base adherent to the bell-shaped tube of the calyx; the three long, much curved anthers united into a small head; stigmas three, each three-lobed; fruit fleshy, with a firm rind. The pumpkins, the squashes in all their great variety, and the vegetable marrows belong to this genus, in which the species are in great confusion. The term pumpkin is in different parts of the country very loosely ap-

plied; in the present article it refers to those varieties of *C. pepo* which are known in the agriculture of the northern states as pumpkin, leaving the others to be described under **SQUASH**. The plant is a vigorous one, often running 12 ft. or more; rough-hairy, and almost prickly;



Field Pumpkin (*Cucurbita pepo*).

the flower stalks are obtusely angled, and after fruiting have five to eight ridges with deep grooves between; the fruit varies in shape, and is marked with longitudinal broad ribs and furrows; the interior is hollow, and traversed by coarse pulpy threads. In its most common form the fruit is a little longer than broad, flattened at the ends, and rather regularly ribbed, and averaging about a foot in diameter, though often much larger; the color a rich clear orange yellow. There is much doubt as to the native country of the pumpkin, it being claimed for the Levant and for Astrakhan, while Dr. Gray ("American Journal of Science," 1857) shows that there is good reason for believing it to have been cultivated in this country by the Indians before the coming of the whites. In the earlier agriculture of the country the pumpkin was a more important crop than at present; it was then raised, as it is now to some extent, as a "stolen crop," a few seeds placed at intervals in a field of Indian corn or potatoes often giving, besides the regular crop, a ton of pumpkins, which afforded a food much relished by cattle, and abundant supplies for the table. Before the introduction of the greatly superior squashes, or even the better varieties of the pumpkin, the common field variety was much used as food, not only as the basis of pumpkin pies, but for a table vegetable, as squash is now served; stewed or baked pumpkin (the fruit divided, the seeds and stringy matter removed, and the halves baked) was a very common article of food, and is still preferred by some to the finer substitutes. For winter use it is cut into thin strips and dried in the sun, or in a warm room. Its use is at present mainly for feeding farm animals, for which purpose the seeds must be removed, as they have a diuretic effect, which is especially undesirable for milking cows. The

best variety for table use is the sugar pumpkin, which, though not large, is an abundant bearer; it has a very long stalk, is of a bright orange color, and has a fine-grained, sweet flesh. Another esteemed variety is the cheese pumpkin, so called from its shape; it is large, and of a deep reddish orange color. The long pumpkin is twice as long as broad; the striped is like the common field pumpkin, but marked with alternate bands of green and yellow, while the Nantucket is deep green when ripe, and a little yellowish on the sunny side, while its surface is marked by warty excrescences; this is much esteemed for its good quality and long keeping. The flesh of the pumpkin contains much sugar, and it is said that during the war of independence housekeepers boiled it in water and evaporated the decoction to a sirup, as a substitute for sugar. Besides the diuretic property already referred to, the seeds are among the most valued anthelmintics for the removal of tapeworm; though this property was ascribed to them a long while ago, they have only recently come into very general use. Dr. Patterson of Philadelphia about 20 years ago published an account of a remarkable cure by their use, followed in an hour and a half by castor oil. The dose of the seeds is two ounces; they are first deprived of their coats, and the kernels beaten in a mortar to a paste, to which water is gradually added.

PUNCH, or **Panchinello**, a humorous character in a species of puppet show exhibited in the streets of European cities. The exhibition is of Italian origin, and its Italian name *Polcinella* or *Puleinella*, according to Gallani in his *Vocabolario del dialetto Napoletano*, was derived from Puccio d'Aniello, a buffoon of Acerra, near Naples, whose humorous eccentricities were in the 17th century transferred to the Neapolitan stage; and the character continues to be the medium of local and political satire in the Italian exhibitions of *fantoccini*, or puppet shows. Another theory derives the name from *pollice*, thumb, a name of dwarfs in several languages. It is thought that the grotesque face is only a modification of the ancient comic mask, and that the character of Punch is kindred to the "Vice" of the old moralities, and the clown of the later drama. The modern drama of "Punch" is supposed to have been composed by Silvio Fiorello, an Italian comedian, about 1600. It embodies a domestic tragedy followed by a supernatural retribution, the whole of which is treated in a broadly farcical manner. Punch is a short obese personage, with an enormous hump on his back, a wide mouth, long chin, and hooked nose, and wearing a three-pointed cap. His wife Judy and his dog Toby are important characters in the performance. A similar puppet show, containing the same leading characters, has been known for ages in China. It is managed by a single individual, who exhibits the theatre on his head, the moving wires being concealed under his gown.

PUNCTUATION, in grammar, the art of dividing a written or printed discourse into sentences and parts of sentences, for the purpose of indicating the mutual relations of the words, by means of points. The principal points used in English composition are the comma (,), semicolon (;), colon (:), period (.), note of interrogation (?), note of exclamation or admiration (!), dash (—), and parenthesis (). Of these, only the first four are marks of punctuation as the term is usually understood, or grammatical points indicating the length and character of the pauses to be made in reading. The others are mainly rhetorical or syntactical aids, regulating the modulation of the tone rather than the suspension of the voice; but the interrogation or exclamation point may take the place of either of the former, according to the structure of the sentence, and the dash partakes of both characteristics. The comma marks the smallest grammatical division in written or printed language. The semicolon separates such parts of a sentence as are somewhat less closely connected than those separated by a comma. The colon denotes a still longer pause than the semicolon. The period indicates the end of an assertive sentence which is grammatically independent of any that follows, and is also used after every abbreviated word, after headings, titles of books, &c., and generally (though improperly) after Roman numerals. The note of interrogation is placed after a question, and in Spanish is also placed inverted at the beginning of a question. The note of exclamation indicates an ardent wish, admiration, or other strong emotion, and is placed after interjections, words used as interjections, and clauses or sentences expressing strong emotion of any kind; it is also duplicated in Spanish like the preceding. The dash is employed where a sentence breaks off abruptly and the subject is changed; where the sense is suspended, and is continued after a short interruption; where there is an unexpected or epigrammatic turn in the sentiment; after a long member, or series of phrases or clauses, leading to an important conclusion; before a word or phrase repeated in an exclamatory or emphatic manner—what elocutionists term an echo; where there is an ellipsis of such words as "namely" and "that is;" where there is an ellipsis of letters or figures; and in numerous other cases. Sometimes, as in this work, it is used instead of paragraphs. The parenthesis encloses a word or phrase introduced into the body of a sentence with which it has no grammatical connection, or an explanatory or other sentence or passage independent of the context.—Other marks in frequent use, and generally treated under the head of punctuation, though not strictly included in it, are the apostrophe ('), used to indicate the omission of a letter or letters, and also as a sign of the possessive case; the hyphen (-), placed between the constituent parts of a compound word, and at the end of a line when a word is divided; quotation marks

(" or '), placed at the beginning and end of extracted passages, of the speeches in dialogue, &c.; brackets or crotchets [], generally enclosing an explanatory phrase or passage inserted by one writer in a quotation from another; and references (consisting of the characters *, †, ‡, §, ||, and ¶, called respectively asterisk or star, dagger, double dagger, section, parallel, and paragraph, or of figures or letters smaller than those of the text), pointing to notes correspondingly marked at the foot or margin of the page.—The ancients were in the habit of writing without distinction of either sentences or words until about 364 B. C. Afterward it became usual to place a mark of distinction at the end of every word, as in the following inscription found near Bath, England:

IVLIVS VITALIS FABRI, &c.

Sometimes, as in the subjoined extract from an inscription given by Montfaucon, a letter laid horizontally was used as an interstitial mark:

P. FERRARIUS HERMES
CAECINIAE ⇨ DIGNAE
CONIVGI ⇨ KARISSIMAE
NYMERIAE ⇨

But there is reason to believe that some system of punctuation was known to the Greeks in the time of Aristotle. It probably consisted of a single mark, which changed its significance according to a change of position. At the bottom of a letter (A.) it was equivalent to a comma; in the middle (A-) to a colon; and at the top (A') to a period; but this plan could only be followed as long as Greek manuscripts were written entirely in capitals. St. Jerome in his translation of the Scriptures used certain marks of distinction or division, which he called *commata* and *cola*; but it has been thought that they consisted simply in writing every clause on a separate line. The modern points came into use very gradually after the invention of printing, the comma, parenthesis, note of interrogation, and period being the earliest introduced, and the note of exclamation the last. The first printed books have only arbitrary marks here and there, and it was not until the 16th century that an approach was made to a regular system by the Manutii of Venice.

PUNJAUB, or **Panjab** (Pers., the country of the five rivers), a province in the N. W. portion of British India, between lat. 27° 40' and 35° 5' N., and lon. 69° 30' and 78° 30' E., and bounded N. by Kafiristan and Cashmere, E. by the Himalaya range and Northwest Provinces, S. by Rajpootana and Bhawalpoor, S. W. by Sind, and W. by Beloochistan and Afghanistan. According to the official statement of the progress and condition of India submitted to the British parliament in June, 1874, the area of the Punjab is 103,748 sq. m., evidently including the Bannu district, which was omitted in the statement of the previous year. (See INDIA.) According to the last census, taken in January, 1868, the population was more than 17,500,000, but is supposed now to

have increased to 19,000,000. There are ten civil divisions, each under a commissioner, and subdivided into districts as follows: 1. Ambala or Umballa—Ambala, Loodiana, Simla. 2. Amritsir—Amritsir, Gurdaspoor, Sealkote. 3. Delhi—Delhi, Goorgaon, Kurnal. 4. Dera-jat—Bunnoo or Bannu, Dera Ghazi Khan, Dera Ismail Khan. 5. Hissar—Hissar, Rohtuk, Sirsa. 6. Jalandhar—Hoshiarpoor, Jalandhar, Kangra. 7. Lahore—Ferozepoor, Gujranwala, Lahore. 8. Mooltan—Jhang, Montgomery, Mooltan, Mozuffergurh. 9. Peshawer—Huzara (Abbottabad), Kohat, Peshawer. 10. Rawulpindi—Gujrat, Jhylum, Rawulpindi, Shahpoor. Under the supervision of the Punjab government are 32 native Himalayan hill states, of which Cashmere is by far the most important. (See CASHMERE.) Of these, five in addition to Cashmere are beyond the river Sutlej; among them Chumba, area 3,216 sq. m., pop. 110,000, paying an annual tribute of £500; Mandi, area 1,080 sq. m., pop. 135,000, annual tribute £10,000; and Sukhet, area 420 sq. m., pop. 45,000, annual tribute £1,100. The remaining 26 hill states lie S. of the Sutlej, and are geographically arranged into four groups, known as the northern, east central, west central, and southern groups. Each of these states is very small, the most important being Nahun or Sirmor, in the southern group, whose sovereign has 90,000 subjects. The affairs of the native state of Bhawalpoor are managed by a British political agent, whose administration is supervised by the lieutenant governor of the Punjab.—The territory of the Punjab is exceedingly irregular in outline, but consists mainly of the extensive plain which slopes S. W. from the highlands of Cashmere. This plain is drained by the Indus, and its five great tributaries, from which the country derives its name, though some geographers improperly regard it as derived from the Indus and its four larger tributaries, excluding the Beas. The Indus is the westernmost river; the tributaries, from W. to E., are the Jhylum, the Chenaub, the Ravee, the Sutlej, and the affluent of the latter, the Beas, all flowing into the Indus near Mittun Kote, lat. 28° 58' N., lon. 70° 23' E., through the Punjnad, a broad stream in which their waters unite about 50 m. N. E. of this point of confluence. The Punjnad is formed by the union of the Chenaub from the north, bearing the accumulated waters of the Jhylum and the Ravee, with the Ghara, or united Sutlej and Beas, from the east. These streams are all described under their own names. The only portion of the Punjab not included in the Indus basin is the region about Delhi bordering the Northwest Provinces, which lie within the valley of the Ganges.—The mountains of the Punjab are confined to the N. E. and N. W. corners of the province. In the former region is the Himalayan district of Kangra, comprising Lahool, Spiti, and Kulo; and in the latter the Salt range, about 2,000 ft. high, trends westward from the Jhylum

and crosses the Indus, beyond which it is known as the Kalabagh and extends to the Suleiman or Solyman mountains in Afghanistan. The general aspect of the districts of the Punjab N. of the Salt range is hilly and even mountainous. The elevation of the great plain at the foot of the mountains, however, is only about 1,000 ft., and thence the surface slopes gradually southward, diversified by scarcely an eminence, until it is little more than 200 ft. above the level of the sea in the southern part of the province, where the country is for the most part an absolute desert.—The plain is divided into five extensive doabs, as the natives term the spaces enclosed between the convergent rivers. Enumerated from W. to E., these doabs are: 1, the Sindh Sagur doab, the largest of all, between the Indus on the west and the Jhylum, Chenaub, and Punj-nud on the east; 2, the Jetch, between the Jhylum and the Chenaub; 3, the Richna, between the Chenaub and the Ravee; 4, the Baree, which is the most densely populated and prosperous, between the Ravee and Chenaub and the Ghara; and 5, the Jalandhar, between the Beas and the Sutlej. Fertility is diffused over the narrow plain along the base of the Himalaya range by the six rivers which there first enter upon it, and the abundant rainfall of not less than 40 inches in the year to which it is subject. Here artificial irrigation is needless. In the northern dry zone, a strip of country below this, from 100 to 200 m. broad, and where the annual supply of rain is between 15 and 30 inches, the rivers have worn down their valleys to a level from 10 to 50 ft. lower than the general surface of the plain. The width of these valleys varies from 4 to 10 m., and they contain the fertile tracts of this portion of the province, called Khadar lands. Their borders are the loftier sterile expanses of the plateau, known as Bangar lands and forming the doabs. These are largely overgrown with grass and brushwood, and though they are fertile, cultivation is dependent upon an artificial supply of water. Near the confluence of the rivers the Khadar lowlands extend from stream to stream and the high tracts disappear; but the aridity of the climate in this region is such that the rivers alone do not suffice to maintain the productiveness even of their valleys, and without artificial irrigation the adjacent country would be a mere waste. Frequent changes occur in the course of each of the great rivers of the Punjab, and from October, when the Indus is lowest, until spring-time, its capacious bed is occupied by a number of shallow watercourses hardly navigable. In the plains the periodical rise of the river begins in February, when the melted snows of the Himalaya begin to come down, and its volume increases till July, when the river is in full flood.—Three kinds of irrigation are practised in the Punjab. In the Himalayan districts and elsewhere in the north, where water is less than 25 ft. from the surface, the

supply for agricultural and horticultural purposes is obtained from wells. A system of irrigation through inundation canals, whereby the water is conducted from the rivers when they are highest, is applied in the comparatively rainless districts wherever the land is low enough. The inundation system comprises the canals of the lower Sutlej and Chenaub division, 39 in number and 632 m. in length, which water the garden-like district of Mooltan; the upper Sutlej canals above Mooltan, 213 m. long; and the Indus canals, of which 600 m. are in the district of Derajat on the right bank of the river, and 66 m. in Mozufgerh on the left. The inundation system, however, was not applicable to the higher lands of the doabs, which require perennial canals to make their natural fertility available. This want has been supplied only to the upper portion of the Baree doab, which is traversed by a canal from the Ravee at Madhpoor, where that river leaves the Himalaya, extending in three branches to Lahore, Kussoor, and Sohraon. In 1872-'3 the main channel of this state canal was 212 m. long, with 692 m. of distributaries, watering 228,796 acres. All the canals are managed by the government irrigation department.—The climate of the plains is dry and exceedingly warm. In the colder season the midday temperature is seldom below 70° F., and not infrequently 80°, while in summer it sometimes rises to 112° in the shade. In the higher northern districts the climate is proportionately cooler.—The flora of the province is not abundant or varied. Characteristic forms of vegetation are acacias, tamarisks, a tree-like caper without leaves, the jujube, and a species of wild palm. There is a great deficiency of timber. The government leases and manages the deodar forests in the native tributary states of the Trans-Sutlej highlands, where this valuable tree grows only at a height of from 5,000 to 9,000 ft. The valleys of all the principal rivers also contain forests of deodar. The Indus is bordered by babul forests in the arid districts of the south near Sinde. In the doabs of the dry region are tracts of wood and jungle called rakhs, from which considerable fuel is obtained, and the management of which, to the extent of about 8,000 sq. m., has recently been undertaken by the forest department. The collection of waif and drift timber on the rivers is regulated by law. In 1872-'3 the receipts from the government forests were but £65,300, against an expenditure of £79,594 upon them. Earnest efforts are being made to promote the growth of forest trees, and the forest administration has established several tree plantations, one of them on the Bari doab canal covering 7,200 acres. Fruit is grown in the vicinity of the towns and villages, the mangoes, oranges, and pomegranates of Mooltan being especially noted for their excellent quality; almonds, figs, mulberries, dates, apricots, peaches, apples, quinces, and melons are also raised. At Lahore there

is an agri-horticultural society, through whose efforts the olive and the Australian blue gum tree (*eucalyptus globulus*) have been introduced into the province.—The tiger is the most formidable of the wild animals found in the Punjab. The lion has sometimes been enumerated among the carnivora of the region, but probably does not now exist in India except within or near the peninsula of Guzerat. The leopard and wild cat commit annoying depredations on the smaller domestic animals. Lynxes, wolves, hyenas, jackals, porcupines, foxes, and hares are common. A species of black bear (*helarctos tibetanus*) is met with in the Salt range, where also the wild pig is distributed in large numbers. Several species of deer and antelopes inhabit the province, and wild sheep, sometimes called deer-sheep on account of their shy habits and fleetness, are numerous in many districts. The fauna of the Punjab is particularly rich in birds, among which are the Asiatic bald-headed eagle, the pea fowl and common jungle fowl, parrots, kites, ravens, jackdaws, owls, pigeons, pheasants, partridges, quails, and many kinds of water fowl, including geese, ducks, herons, cormorants, pelicans, and the black ibis. The Indian alligator haunts the rivers, which abound in many varieties of excellent fish. Fish is extensively eaten by the people.—The principal mineral product is rock salt, which occurs on the S. side of the Salt range in deposits said to be unsurpassed elsewhere in the world in extent or purity. It is mined from considerable depths and also quarried at the surface, and there are at least 12 localities in the range at which vast deposits are known to exist. Salt of a black or dark green hue is quarried in the hills of the Kohat district. Small quantities of gold, quite insignificant in proportion to the labor required to obtain them, can be washed from the gravel of many of the streams. Petroleum has been discovered at Rawalpindi and elsewhere, but has not yet been put to any practical use.—Among the more important agricultural products are wheat, sugar, rice, barley, millet, maize, peas, beans, mustard, and hemp and other fibres. In 1872-'3, 47,781 acres were planted with *crotalaria juncea*, a leguminous annual yielding the fibre known as sunn, from which twine is made. Tobacco was grown on 90,000 acres, and 7,732 acres are included within the 28 tea plantations of the Kangra district, where the average yield is 130 lbs. per acre. The crop of 1872 amounted to 428,655 lbs. The breeding of horses is encouraged by the government, which keeps 37 stallions in the province. An important horse fair is annually held at Rawalpindi for market purposes as well as the distribution of government prizes. There are also great cattle fairs at Hissar and Sirsa, sometimes attended by more than 25,000 persons. Sheep are raised in the grazing districts from English imported stock.—The manufactures of the province, valued at £5,315,400 in 1872-'3, consist largely of cotton, which is

made into white and colored cloths and thick striped cloth for floors; woollen goods, from the fleeces of sheep, goats, and camels; and silk made at Amritsir, Lahore, and Mooltan, out of the raw material imported from Bengal, China, Afghanistan, and eastern Turkistan. The industrial progress of the country is actively stimulated by the numerous fairs frequently held in various localities. Of these there are 128 in the Punjab, each attended by at least 10,000 persons, and some by more than 100,000. In the year 1872-'3 the value of the trade up the Indus was £47,588, against a downward trade of £448,476, while the external trade of the province amounted to £5,024,883.—According to the parliamentary accounts for 1872-'3, there were in that year 410 m. of railway in the Punjab, 2,470 m. of water communication, and 20,798 m. of roads. The railway system is not yet completed. At present there is the great trunk road from Delhi to Lahore and thence to Mooltan, whence the broad gauge Indus valley line, 480 m. in length, now in process of construction, will run southward to Kotree and there meet the Sindh railway from Kurrachee. Lahore is also to be connected with Peshawer by a narrow gauge line, 270 m. long, with three costly bridges over the Ravee, Chenuab, and Jhylum rivers. Lines of telegraph are already in existence along all these routes.—The ancient village communities have maintained their organization intact throughout a great part of the Punjab, and the proprietors of the soil usually cultivate it themselves, paying the land tax through the elders of their village. Otherwise the land settlement is like that of the Northwest Provinces. The revenue derived from it is easily collected, and in 1872-'3 amounted to £2,005,666. A revenue of £811,190 was derived from the sale of salt and the duties on that mineral collected at the customs line, 982 m. long, which runs down the Indus, and is intended to restrict the importation of red salt from Peshawer. The opium excise and licenses for the sale of drugs and spirits yielded £87,633. In the same year, under a new arrangement, the local authorities received £748,718 from the supreme government of India for provincial expenditure upon jails, police, education, hospitals, roads, buildings, miscellaneous public improvements, and other objects of a local character; and the disbursements out of provincial funds amounted to £515,153. The local revenue in that year was £751,040, and the local expenditure £468,174. Municipal institutions for local taxation and expenditure have been organized by the British government in 125 cities and towns, and 189 smaller places; a few of the more important municipalities elect their own officers.—The population of the Punjab is made up of Mahomedans and Hindoos in the proportion of about two to one. The Sikhs constitute about half of the smaller and Hindoo portion. The total number of native Protestant converts to

Christianity in the province in 1872 was 1,870, of whom 14 were ordained ministers, and 707 were communicants. There are two colleges in the Punjaub affiliated to the university of Calcutta: one at Lahore, with 52 students in 1872-'3; the other at Delhi, attended by 36 students. The government maintains three normal schools and aids six others; of high schools it supports six and assists ten. There is a special educational institution at Ambala for instructing the wards of the government and the sons of natives of rank; and the government also manages an Anglo-Arabic school at Delhi endowed by a native nawaub. The entire number of government primary or village schools in the province is 1,046, having an average daily attendance of 51,251 pupils, in addition to which there are 188 aided schools of the same class with an average attendance of 20,825. There are 345 schools for girls, of which 91 are wholly sustained by the government, while the rest receive aid from it. No insignificant educational influence is exerted by the central museum at Lahore, which is visited by nearly 50,000 persons annually. There are 14 newspapers in the province, all printed in native languages except two, which are in English. In 1872-'3, 344 books were published. About 20,000 men are employed as police, more than half the number being Mohammedans. There are 34 jails; a ticket-of-leave system exists, and the prisoners are employed in industrial pursuits. The number of government hospitals and dispensaries is 116, including the Mayo hospital connected with the medical school at Lahore. A system of elementary medical instruction has been introduced for native physicians, who are supplied with the requisite medicines and paid for their services in times of epidemic.—In a military sense, the position of the Punjaub is more important than that of any other province of India, lying as it does in the very highway of invasion from the interior of the Asiatic continent. A large British force is constantly garrisoned there; in 1872-'3 it consisted of 35,885 men, with 97 field guns. In addition to this, the lieutenant governor had under his orders a frontier force of 12,416 troops, principally Sikhs, Gorkhas, and natives of the Punjaub.—The government of the province is administered by a lieutenant governor, whose official residence is at Lahore. The highest judicial authority is vested in a chief court composed of a barrister and a civilian judge. In addition to Lahore, the chief towns are Delhi, Peshawer, Amritsir, Ambala or Umballa, Rawalpindi, Mooltan, Ferozepore, Leia, and Dera Ismail Khan.—In the year 327 B. C. Alexander the Great invaded the Punjaub, crossed the Indus, Jhylum (anc. *Hydaspes*), Chenaub (*Acesines*), and Ravee (*Hydraotes*), and marched to the right bank of the Beas or of the Sutlej (to either of which the ancient name *Hyphasis* may be referred), which was the limit of his advance eastward. At that time the country

was ruled by a Hindoo monarch named Taxiles in the west, and by a sovereign called Porus, whose dominions extended from the Jhylum to Delhi. After the Greek invasion the whole appears to have become a part of the kingdom of Maghada, which existed until about 195 B. C. For many centuries subsequently the history of the Punjaub is enveloped in much doubt and obscurity. About A. D. 1000 Mooltan appears as a Mohammedan state, though it is not clear how it became so. At this period Mahmoud of Ghuzni invaded India from Afghanistan, subjugated the Punjaub, and made Lahore the seat of his dynasty, which came to an end in 1186. It was afterward subject to numerous different chieftains, principally Afghans, who ruled it until it was invaded and pillaged by Timour and his army in 1398. The Mogul dynasty was finally established over the country by his lineal descendant Baber in 1526. Humayun, son and successor of Baber, lost the province temporarily, but recovered it in 1555 from his Afghan rival, Shere Ali Khan. The Punjaub was the scene of a considerable insurrection in 1709-'11 on the part of the Sikhs, who had long been persecuted by their Mohammedan rulers, and it was quelled with some trouble by Bahadoor Shah, who had not long previously succeeded his father Aurungzebe on the throne. In 1752 the Afghan king Ahmed Shah Abdalli entered the province, exacted contribution from its inhabitants, and a few years later forced the Mogul emperor to cede it to him. Soon afterward the growing power of the Sikhs was manifested by a fresh uprising in the districts E. of the Jhylum. The Afghan dynasty terminated in 1809, and by that time Runjeet Singh, the greatest chieftain of the Sikhs, had acquired Lahore and controlled the larger portion of the province through a confederacy of the various Sikh clans within its boundaries. He endeavored to force the Sikh hill states E. of the Sutlej into this confederacy, and only yielded his claim to their allegiance upon the advance of a British army to the banks of the river. He reigned till 1839, and in the interval conquered Mooltan, Peshawer, and the Derajat district beyond the Indus. A period of anarchy followed the death of his son and successor Khuruk Singh in 1840, and the Sikhs finally determined to invade the British territories in India. Thus, in 1845, began the first Sikh war, in which were fought the battles known as those of the Sutlej. The Sikh forces were defeated with heavy loss, and in 1846 the English took possession of the Jalandhar doab and the Sikh territories on the left bank of the Sutlej, and undertook the guardianship of the young Maharajah Dhuleep Singh, a grandson of Runjeet Singh and then a minor. In 1848 the disaffection of the chieftains led to the second Sikh war, in which the most celebrated battle was fought at Chillianwallah, where the English were nearly defeated; but the result of the contest

was the annexation of the Punjab to the British dominions, by a proclamation of the viceroy on March 29, 1849. (See SIKHS.) During the sepoj mutiny of 1857 Sir John Lawrence (now Lord Lawrence) was chief commissioner of the Punjab, and by his prompt action in disarming the native regiments, the confidence which he displayed in the Sikhs as friends of the British, and his judicious administration generally, the rebellion was rendered utterly unsuccessful in that part of India.

PUNTA ARENAS, the only seaport town of Costa Rica on the Pacific, situated on the E. side of the gulf of Nicoya, about 60 m. W. by N. of San José; permanent pop. about 300. The town stands on a sandy point which projects into the gulf. Vessels drawing more than 7 ft. of water are obliged to anchor 3 m. from shore, in the outer harbor, which is protected from the swell of the Pacific by two islands. An inner harbor, between the point and the mainland, is accessible only for vessels of very light draught. The climate is unhealthy, but less so than that of other parts of the coast. Punta Arenas is the port of San José, with which it is connected by a good carriage road, and a railway is projected. There is a telegraph line to Cartago, which is to be continued to Limon on the Atlantic. The steamers of the Panama railway company and those of the Pacific mail steamship company touch regularly at Punta Arenas. In 1873 the entries at the port were 97 ships, of 15,464 aggregate tonnage. The port was established in 1840, when Caldera, S. of it, was abandoned on account of its unhealthfulness.

PUPA. See BUTTERFLY, and CHRYSALIS.

PURBACH, or **Peurbach**, **Georg**, a German astronomer, born at Peurbach, Austria, in 1423, died in Vienna in 1461. He studied astronomy under Gmunden at the university of Vienna, went to Italy, and on his return succeeded his master in the professorship at Vienna. At the time of his death he was reputed the first astronomer in Europe. He began a new edition of Ptolemy's *Almagest*, based upon the Latin translation from the Arabic; and though he neither understood Greek, in which the work was originally written, nor Arabic, his knowledge of astronomy enabled him to make his edition much better than previous ones. He left this work unfinished to his pupil Regiomontanus, who completed it. The most celebrated of Purbach's own works is his posthumous *Theoria Novæ Planetarum* (1472), which served as an introduction to Ptolemy.

PURCELL, **Henry**, an English composer, born in London in 1658, died Nov. 21, 1695. While a singing boy in the choir of the king's chapel he composed several anthems. At the age of 18 he was appointed organist of Westminster abbey, and six years afterward one of the three organists of the chapel royal. His anthems previously written were very popular, and in 1677 he composed the music for an operetta by Tate, entitled "*Dido and Æneas*," performed

by the pupils of a female boarding school. The success of this work encouraged him to become a regular writer for the stage, and for the play of "*Abelazor*" (1677), Shadwell's adaptation of "*Timon of Athens*" (1678), and Lee's "*Theodosius*" (1680), he composed the overtures and songs. A number of his instrumental pieces in four parts were published by his widow in 1697, under the title of "*A Collection of Ayres*, composed for the Theatre and on other occasions, by the late Mr. Henry Purcell." Next in order of his compositions was a series of 12 sonatas for two violins and a bass published in 1683, followed by another series of 10. Subsequently he produced the greater part of his dramatic music, and set the songs, dialogues, and choruses in several of Dryden's most successful plays. In 1690 he composed new music for the "*Tempest*," as adapted for the stage by Dryden and Davenant, and within the next two years he similarly embellished Dryden's "*King Arthur*," "*Indian Queen*," and "*Tyrannic Love*." For D'Urfey's three parts of "*Don Quixote*," produced in 1694-'6, he furnished the two songs, "*Let the dreadful engines*" and "*From rosy bowers*." He also furnished the music for "*Bonduca*," a tragedy by Beaumont and Fletcher made into an opera by Dryden, in which occurs the well known duet and chorus, "*Britons, strike home*;" and vocal pieces for Beaumont and Fletcher's "*Diocletian*," altered by Betterton, Dryden's "*Aurungzebe*," and Shadwell's "*Libertine*." These works were published by his widow in 1697 under the title of "*Orpheus Britannicus*." His published anthems number 50, besides a celebrated *Te Deum* and *Jubilate*, with orchestral accompaniments; and his church music includes a complete service and a number of hymns and psalms. His odes, glees, catches, rounds, &c., were also numerous and popular. Purcell died of consumption, and was buried in Westminster abbey.

PURCELL, **John Baptist**, an American archbishop, born in Mallow, Ireland, Feb. 26, 1800. He came to the United States at an early age, began his theological studies in Mount St. Mary's college, Emmettsburg, Md., completed them in St. Sulpice, Paris, and was ordained priest in that city in 1826. After his return to the United States he taught theology at Mount St. Mary's, and became president of the college in 1829. He was appointed bishop of Cincinnati in 1833, when there was but one Roman Catholic church there, while the diocese comprised the entire state of Ohio; but the numbers of his flock rapidly increased, and he founded many important institutions. The diocese was divided in 1847 by the erection of Cleveland into an independent see, and the diocese of Columbus was separated in 1868. In 1860 he was made an archbishop. In 1869 he attended the council of the Vatican, and voted against the opportuneness of defining the doctrine of pontifical infallibility. After his return to Cincinnati in 1870, he was involved

in a public discussion with the freethinker Vickers. Previously, in 1837, he had a seven days' discussion with the Rev. Alexander Campbell, which excited great interest, and an account of which was afterward printed in a volume. Archbishop Purcell has published a volume of "Lectures and Pastoral Letters," and edited Kenelm Digby's "Ages of Faith" and Donald Macleod's "History of the Devotion to the Blessed Virgin Mary in North America" (New York, 1866).

PURCHAS, Samuel, an English author, born at Thaxted, Essex, in 1577, died about 1628. He was educated at St. John's college, Cambridge, and in 1604 became vicar of Eastwood in Essex. Removing to London, he received the rectory of St. Martin's, Ludgate, and became chaplain to Archbishop Abbot. He compiled from more than 1,300 authorities a work entitled "Purchas his Pilgrimage, or Relations of the World, and the Religions observed in all Ages, and Places discovered, from the Creation unto this present" (fol., 1613); and a collection of voyages under the title, "Purchas his Pilgrimages" (4 vols. fol., 1625). The third and fourth volumes relate to America. He also wrote "Microcosmus, or the History of Man" (1619), and "The King's Tower, and Triumphant Arch of London" (1623).

PURGATORY (Lat. *purgatorium*, a place for cleansing), in the belief of the Roman Catholic and the eastern churches, a state of temporary suffering in the next world, where the souls of the just expiate the offences committed in this life. The liturgies of the Latin church and of all the eastern churches, without exception, contain prayers for the repose of departed souls. According to Catholic theologians, every sin, no matter how slight, deserves and will receive punishment either before or after death. The absolution of a priest in the sacrament of penance washes away the guilt of sin and remits the eternal punishment due for grave offences, but not the temporal penalty which has to be undergone as a satisfaction to God's justice. Baptism alone removes both the guilt and the penalty; and as few or no adult persons depart this life without having committed sins after baptism, there must be some middle state for such as do not deserve hell and are yet not pure enough to enter heaven. The Catholic church has not defined the nature and duration of the punishment of purgatory, or declared that it is situated in any particular place. She believes that the sufferings of souls in the middle state may be abridged by indulgences, masses, and the prayers of their friends on earth; and one day in the year (All Souls' day, Nov. 2) is specially devoted to services and prayers for their benefit. Roman Catholic theologians commonly teach that the purification of departed souls is effected by fire, while the Greeks regard the soul after death as being purified "through tribulation." This point was left open by the council of Florence in 1439, as was the question concerning the

duration of purgatorial suffering. The Waldenses and other sects in the middle ages protested against the belief in purgatory and the practices it involved. The reformed churches also rejected them.—See Bellarmin, *De Ignis Purgatorio*; Leo Allatius, *De utriusque Ecclesie in Dogmate de Purgatorio perpetua Consensione*; Wiseman, "Lectures on the Doctrines and Practices of the Catholic Church" (2 vols., Baltimore, 1852); and Hodge, "Dogmatic Theology," vol. iii. (New York, 1874).

PURGSTALL, Hammer. See HAMMER-PURGSTALL.

PURITAN, an epithet first applied in 1564 to English nonconformists, which continued to designate them during the reigns of Elizabeth and the first two Stuarts. During the reign of Mary the stricter nonconformist element of the church was driven out of the country, and a number of exiles at Frankfort resolved to use in public worship the Genevan service book, in preference to the book of King Edward VI. They were resisted in this by other exiles and failed, but renewed the struggle on their return to England after the accession of Elizabeth. There were different degrees of puritanism, some seeking a moderate reform of the English liturgy and discipline, others wishing to abolish episcopacy, and some declaring against any church authority whatever. Representatives from these three classes formed the bulk of the settlers of New England, and the union of them in the English civil wars effected the overthrow of royalty and the establishment of the commonwealth. At the time of the restoration the name became one of reproach. Since the relaxation in 1690 of the acts against the nonconformists, it has ceased to designate any particular sect.—See Neal, "The History of the Puritans" (revised ed. by Joshua Toulmin, 5 vols. 8vo, Bath, 1793-7; American ed., with notes by John O. Choules, 2 vols. 8vo, New York, 1844), and Bacon, "The Genesis of the New England Churches" (New York, 1874).

PURPLE (Gr. πορφύρα; Lat. *purpura*), a color produced by the union of red and blue, and of various shades as one or the other of these predominates. The ancients esteemed it more highly than any other color, sometimes making it a distinctive badge of royalty, and again appropriating it to religious uses, as the decorations of the temple and of the garments of the priests. In the Old Testament it is frequently referred to in Exodus and other books. But it is supposed by some that the purple of the Israelites was a scarlet, or even that the term was used generally for any color in which red predominated. Tyrian purple, the purple of the Greeks and Romans, was obtained from the *murex*, a genus of gasteropod mollusks found in the Mediterranean. (See MUREX.) The use of this color passed away with the decline of the Roman empire, and a simple purple color, that is, one not made by using two separate dyes, was not known until a Florentine, Orchillini, discovered the dyeing proper-

ties of the lichen called orchilla weed. Other lichens growing in different parts of the world now furnish the dye known as orchil or archil. (See ARCHIL.) Shades of purple are abundantly obtained from coal-tar colors. (See ANILINE, DYEING, and MAUVE.) The compounds called "purpurates," especially the purpurate of ammonia, called by Liebig and Wöhler murexide, from its resemblance to the Tyrian purple, present beautiful shades of purple. (See PURPURATES.)

PURPLE OF CASSIUS. See CASSIUS, PURPLE OF. **PURPURATES**, salts of purpuric acid. Scheele in 1776 found that a solution of uric in nitric acid produced a beautiful deep red dye. Prout in 1818 obtained this coloring matter in a crystalline form, and regarded it as purpurate of ammonia. By double decomposition he obtained metallic purpurates having a similar color. The colorless substance which separated from purpurate of ammonia by the action of strong acids, he regarded as purpuric acid; but Liebig and Wöhler showed that this did not possess the property of forming colored salts, and therefore held that Prout's compound was not an ammonium salt, but an amide, which they called murexide. (See MUREX.) Later researches by Freitzsch and Beilstein indicate that it is a true ammonium salt; still the purpuric acid has never been isolated, because it is decomposed when its salts are treated with a stronger acid. The formula of purpurate of ammonia or murexide is $C_8H_8N_6O_6 = NH_4C_8H_7N_6O_6$; therefore the acid is represented by the formula $C_8H_7N_6O_6$. Murexide is the principal salt, and is a beautiful purple, but is becoming superseded by rosaniline.

PURSH, Frederick, an American botanist, born in Tobolsk, Siberia, in 1774, died in Montreal, Canada, June 11, 1820. He was educated at Dresden, came to America in 1799, and spent 12 years in botanical explorations. In 1811 he visited England, and published "*Flora America Septentrionalis*, or a Systematic Arrangement and Description of the Plants of North America" (2 vols. 8vo, London, 1814). He was engaged in the collection of materials for a flora of Canada when he died.

PURSLANE, the common name (of obscure derivation) for *portulaca oleracea*, one of the most common weeds of our gardens, and often abbreviated to "pusley." *Portulaca* (the ancient Latin name) gives its name to a small family of succulent annual or perennial herbs, the *portulacaceæ*, closely related to the pink family, from which they are mainly distinguished by their two-sepalled calyx, and the often transversely dehiscent capsule, which opens by the falling away of the upper part as a lid. The common purslane is a prostrate, smooth, annual plant, its fleshy and often reddish stems spreading in all directions, and forming a mat a foot or more across; the alternate or opposite leaves are wedge-shaped or obovate, and half an inch to an inch long; the axillary or terminal flowers sessile; the

two-cleft calyx cohering with the ovary below; petals five, yellow, and with the 7 to 12 stamens inserted on the calyx at the point where it becomes free from the ovary; ovary one-celled, with a deeply five- to six-parted style, ripening to a many-seeded capsule, which opens by a lid; the kidney-shaped seeds are shining and handsomely marked with a network. The flowers open only in bright sunshine, usually about 11 o'clock A. M., and remain but a short time. Purslane has been used as a pot herb from very ancient times, a fact recognized in its specific name, *oleracea*; and though it is but little used in this country, it is cultivated in French gardens as *pourpier*, and seeds of the green, golden, and large golden varieties are offered in their catalogues. When grown rapidly in a rich soil, and properly served, it is to many a most acceptable vegetable. In this country it finds a congenial climate, and is everywhere one of the most



Common Purslane (*Portulaca oleracea*).

prominent weeds; it gives but little trouble before hot weather sets in, but grows then with astonishing rapidity; so tenacious of life is it, that it must be entirely removed from the ground or it will go on and perfect its seeds. Pigs are very fond of it. The hairy purslane, *P. pilosa*, with narrow cylindrical leaves and pink or purple flowers, is found in Florida; and *P. retusa*, which much resembles the common species, with its leaves notched at the ends, is common west of the Mississippi.—The garden portulacas, probably all to be referred to the South American *P. grandiflora*, though several different names have been given to them, have cylindrical leaves and very large showy flowers of the most brilliant colors, from white through yellow, orange, and red, to bright purple, and often striped or blotched with two colors; the double ones are very fine, and deserve the name of "portulaca roses" given them by the German florists.—

The sea purslans, *sesuvium portulacastrum*, found along the shores of the southern states, and *S. pentandrum*, from Long Island southward, have much the habit of the common purslane, but have no petals, though the calyx is purplish inside, and usually numerous stamens.—Black purslane and milk purslane are names given in some parts of the country to *euphorbia maculata* and *E. hypericifolia*, which are also common garden weeds, and have a prostrate habit like purslane; they can at once be distinguished from purslane by their copious milky juice. They belong to a dangerously active family, and the term purslane should not be applied to them, as their proper name is spurge.—Belonging to the purslane family are several interesting genera, including *Claytonia*, with two handsome species known in the eastern states as spring beauty, and a dozen or more on the Pacific coast. *Calandrinia* is an allied showy genus, some species of which are cultivated in gardens.

PURÚS, a river of South America, rising about lat. 14° S., in the mountains E. of Cuzco, Peru, and flowing in a northeasterly direction to its junction with the Amazon, into which it falls by two principal and three minor mouths, the extremes of which are over 100 m. apart. The most easterly branch is 125 m. W. of the Rio Negro. A part of its upper course is on the borders of Peru, Bolivia, and Brazil, and the lower, more than half of the whole, through the latter country. Its entire length is estimated, inclusive of curves, at upward of 2,000 m., and it flows through uninterrupted primeval forests of great beauty. The Purús, probably the Amam-mayu of the Incas and the Madre de Dios of the early Spaniards, is the most important of all the Amazon feeders W. of the Madeira, parallel to which it rolls and with which it communicates. It is navigable uninterruptedly from the Amazon, about lon. 60° 30', to southern Peru.

PUSEY, Edward Bouverie, an English clergyman, born in 1800. He is the second son of the Hon. Philip Bouverie (who assumed the name of Pusey), younger brother of the first earl of Radnor. He graduated at Christ Church, Oxford, in 1822, obtained a fellowship in Oriel college, took orders, and in 1828 became canon of Christ Church cathedral and regius professor of Hebrew in the university, a post which he still holds. He shares with Dr. Newman the reputation of originating the so-called Anglo-Catholic movement in the church of England in 1833, which finds its best exponent in the celebrated "Tracts for the Times." Many of these, including an elaborate treatise on baptism, were written by Dr. Pusey, who also published letters in defence of his views to the archbishop of Canterbury and the bishops of Oxford and London. The characteristic tenets of the "Puseyite" party are judgment by works equally as by faith, baptismal regeneration, the apostolic succession of the clergy, the supreme authority of the church, the expedi-

ency of auricular confession and conventual establishments, and an efficacy in the sacraments of the church not inferior to that claimed exclusively by the Roman Catholic church. They aimed also at certain innovations in the ceremonies of public worship. In 1843 Dr. Pusey preached a sermon before the university, in which he was understood to confess his belief in the doctrine of transubstantiation; and after an examination before a board of judges he was accordingly suspended from the office of preacher within the precincts of the university for three years. He was one of the editors of the "Library of Translations from the Fathers" and of the "Anglo-Catholic Library," and has adapted to the use of the church of England several Roman Catholic devotional works. He has published "Causes of Rationalism in Germany" (1828); "Remarks on Cathedral Institutions" (2d ed., 1833); "Royal Supremacy in Spiritual Matters" (1850); "The Doctrine of the Real Presence, gathered from the Fathers" (1855); "The Real Presence the Doctrine of the English Church" (1857); "History of the Councils of the Church, A. D. 51-381" (1857); "Commentary on the Minor Prophets" (in numbers, 1860-'62); "Daniel the Prophet: nine Lectures" (1864); and "The Church of England a Portion of Christ's one Holy Catholic Church" (1865).

PUSHKIN, Alexander Sergeyevitch, a Russian poet, born in Pskov, June 6, 1799, died in St. Petersburg, Feb. 10, 1837. He was the son of a nobleman, studied at Tzarskoye Selo, and became a clerk in the foreign office. In 1820 he was expelled on account of his "Ode to Liberty," and subsequently he was expelled from Odessa for his tirade against the governor general. The emperor Nicholas, after his accession in 1825, reinstated him in his clerkship at St. Petersburg, and appointed him to prepare the history of Peter the Great. This shook his friends' belief in his liberalism, and his life was further embittered by what he fancied to be undue attentions paid to his beautiful wife by George Charles d'Anthès, a French officer in the Russian army (the future senator baron de Heeckeren). Although d'Anthès married Mme. Pushkin's sister to disarm the husband's suspicion, Pushkin fought a duel with him and was killed. The emperor gave a pension of 10,000 rubles to the widow, and provided for the children's education, and for the publication of a superb edition of Pushkin's works. A public subscription for a monument in his honor amounted on Jan. 1, 1874, to about 75,000 rubles. Among his earliest works were the poems "Ruslan and Liudmila," "The Prisoner of the Caucasus," a sketch, and "The Fountain of Bakhchiseraï," resembling Byron's "Corsair." His masterpiece, "Eugene Onegin," a novel in verse, appeared between 1825 and 1828. His other works include the narrative poems "The Gypsies" (1827) and "Poltava" (1829); the dramatic poems "Boris

Godunoff" and "The Stone Guest" (1836); and the novels "The Captive's Daughter" and "The Captain's Daughter." The latter and other novels are comprised in "Russian Romance, from the Tales of Belkin," an English translation by Mrs. J. Buchan Telfer, *née* Muravieff (London, 1875). Prosper Mérimée and Viardot have translated some of his works into French, and Bodenstedt and others into German. The best complete editions of Pushkin's works are by Anenkoff (7 vols., St. Petersburg, 1854-'7) and Gennadi (6 vols., 1869 *et seq.*).

PUSTULE, Malignant, a specific disease, essentially septic and gangrenous, confined to the cutaneous tissue, and generally to those parts of the surface that are habitually uncovered. It appears most commonly on the face, and next on the hands, neck, and arms. It first appears in the form of a painful swelling, which, after a lapse of time varying from one to three days, rarely more, develops upon its central part a small reddish or purple spot, accompanied with itching. In the course of 12 or 15 hours more this spot changes into a bleb or vesicle, not usually larger than the head of a pin, containing a reddish brown or yellowish fluid. Owing to continued itching, the vesicle is ordinarily ruptured soon after its appearance; if otherwise, it dries up in about 36 hours, leaving the exposed derma dry, and generally of a livid color. Itching now ceases; and, after a time varying from a few hours to a day, the centre of this discolored and denuded surface begins to grow hard and becomes surrounded by an inflamed areola covered with numerous small vesicles similar to the vesicle which first appeared. The middle of this areola is depressed, and the color varies from yellow to black. It is now hard in the centre and more painful than at any other stage. But it is a remarkable feature of malignant pustule that severe pain is generally absent; and this character, so different from all other acute inflammations of the skin, is a valuable negative diagnostic of the disease. During the next 24 or 48 hours the subcutaneous tissue becomes involved; the tumor strikes deeper and rapidly extends in all directions, yet it is so indurated as to be easily circumscribed, and its confines determined without difficulty. Meanwhile the central point, now of brown or livid hue, exceedingly hard and insensible, becomes gangrenous. If the disease makes no further progress, an inflamed circle of vivid redness now surrounds the gangrenous portion; the tumefaction, which had before rapidly extended, diminishes; and the patient experiences something like an agreeable warmth accompanied by a pulsatory motion of the affected part. The pulse, which had before grown irritable and feeble, revives; strength increases; if there has been some degree of fever, as occasionally happens, it is now resolved into a gentle perspiration; suppuration sets in between the living and the

dead parts, and the detachment of the gangrenous portion leaves a suppurating surface of variable extent in different cases. When the disease tends to an unfavorable issue, generally no suppuration takes place; the gangrene spreads rapidly from the centre to the circumference of the tumor; the pulse becomes smaller and more contracted; the patient complains of extreme lassitude with inability to sleep, is attacked with fainting fits, and becomes passive as to the result; there is disinclination to take food or medicine, or have anything done, and a total loss of appetite; the tongue is dry and brown; the features shrink; the skin is parched; the eyes are glassy; and increasing debility and a low delirium indicate a fatal termination. Such are in general the ordinary phenomena of malignant pustule, usually terminating in from five to eight days. Exceptional fatal cases have been recorded, varying from 24 hours to 16 days. In the suddenly fatal cases, the forces of the constitution are so quickly and entirely subverted by the malignancy of the disease, that few symptoms are manifested; the powers sink under it, as it were, without resistance. It is most fatal when attacking the face or neck.—Another variety, which commonly attacks the hands or arms, is of a less regular character, in some cases presenting an appearance and running a course very similar to a circumscribed phlegmon, while in others it is exceedingly violent and fatal in a few hours, and in others still runs on for several weeks, and finally proves fatal rather from the effects of the disorder than from the disease itself. In the majority of these cases there is intense local pain in the affected part from the commencement, with enormous swelling and more or less redness. A small vesicle or pustule forms in the centre, and takes on a gangrenous character. Sometimes it becomes circumscribed and limits its action to the skin; but at other times numerous phlyctenæ cover the surface, and the destructive inflammation burrows into the cellular tissue which envelops the muscles, completely surrounding and disintegrating these organs, which become soft, black, and gangrenous. The blood vessels and nerves also become involved, and as a necessary consequence the death of the part ensues.—The pathology of malignant pustule is distinguished by a fluid state of the blood, which is usually very dark-colored; the texture of the heart is softened, and its surface covered with ecchymosed spots; the veins are sometimes softened and ecchymosed, and usually contain black or yellowish white clots of blood, of gelatinous consistence. The lungs are covered with superficial ecchymoses, presenting over their surface a number of deeply penetrating black spots, produced by local sanguineous infiltration. The inner coat of the stomach and intestines presents in different places, corresponding to the course of the vessels, prominent, dark-colored spots, formed by blood effused between the inner coats and the peritoneal cov-

ering.—*Causes.* It is the general conclusion of those who have investigated the nature of malignant pustule, that the germ of the disease consists in an animal poison, usually contracted by man from cattle or their remains. In support of this view, it is found that the disease most frequently occurs among knackers, tanners, veterinarians, persons engaged in the removal of offal, and stevedores, particularly those employed in handling hides from districts and countries where the diseases of cattle most prevail. In other cases it has been attributed to eating diseased animal food. Yet, strange as it may appear, in the whole scope of veterinary medicine no disease is known which accurately resembles the malignant pustule of man. Certain herbivorous animals, especially beasts of pasture, are subject to a disease called malignant carbuncle, characterized by the occurrence of a large uncircumscribed emphysematous tumor, which yields to pressure and crepitates under the fingers, and exhales a peculiar putrid odor. In its progress it turns black in the centre, and appears as if burned or charred; it is infiltrated with a yellowish colored fluid, and distended with a fetid gas. This disease may be transmitted from one animal to another by inoculation, and by absorption to man, in whom it runs a violent and dangerous course. MM. Salmon and Manoury of France have vainly attempted to limit the term malignant pustule to this disease only. Malignant carbuncle and other ulcers which occur in cattle are the eruptive symptoms of grave febrile disorders depending upon a diseased state of the blood, and always consecutive to the febrile symptoms; and the inoculation of man with matter from such an ulcer is only equally dangerous with the blood, and possibly the milk, of the same animal in the febrile state before the ulcer appeared. Indeed, cases have occurred where the blood of animals not previously known to have been diseased has caused malignant pustules in man by absorption. It is the opinion of some observers that malignant pustule may occur spontaneously, without any contact with poisonous animal matter. But from the fact that diseased animal matter is known to cause the great majority of cases, many ways will readily suggest themselves by which inoculation might take place without any knowledge of the circumstance on the part of the person affected. As a general rule, cattle which feed on prairie meadows are exempt from malignant disease; while those which are fed upon dried clover, lucern, and vetch are peculiarly liable to carbuncle. The same may be said of cattle that are fed upon semi-decomposed grain, the refuse of distilleries and breweries. All such things are actively predisposing agents to the blood diseases of cattle, and liable to engender malignant pustule in man.—*Treatment.* Promote suppuration in the pustule as rapidly as possible, and sustain the constitution. To this end, as soon as the nature of the disease is as-

certain, the vesication formed on its surface should be opened, the fluid contents removed, and the denuded part covered with a drossil of lint dipped in a strong solution of muriate of ammonia or other caustic. Six hours afterward this may be removed and a poultice applied; and 24 hours after this, if pain and burning heat have nearly or quite ceased, and no areola has formed, it may be safely concluded that the caustic has effectually permeated the whole of the diseased tissue, and that it will proceed to a healthy suppuration by the continued application of poultice. But if, on the contrary, a hard and deep-seated painful tumor has formed around the primary seat of the vesicle, we may take it for granted that the disease is extending itself. The tumor should be forthwith divided through the whole width and depth by a crucial incision, the gangrenous parts removed if any have formed, and the nitrate of silver or fused potassa thoroughly applied to the freshly divided surfaces. This proceeding is equally requisite when the slough which forms on the centre quickly becomes hard and impermeable, like a piece of dry hide; this must be removed to admit of the unimpeded action of the caustic. Scarifications and cauterizations, with the continued application of poultice, should be repeated daily until suppuration is established, or until the extent of the pustule is clearly defined. Internally, the bowels being first cleared by a mild cathartic, quinia (four or five grains every three or four hours), with wine or brandy, and as much food as the patient can be induced to take (there being generally disinclination to take food), and opiates with camphor, as much as may be necessary to allay pain and produce sleep, constitute the basis of treatment. In spite of everything, the peculiar contagion of malignant pustule, being in the blood, frequently proceeds straight on to a fatal termination; and this is sometimes the case even when the pustule seems to have been checked. On recovery from malignant pustule, the deformities consequent upon its ravages sometimes require surgical operations for their relief.—*History.* Malignant pustule was known to the ancients. Celsus and Paulus Aegineta both described it under the head of carbuncle. Ambroise Paré, in the 16th century, distinguished it from plague. Yet it was not until the latter part of the 18th century that physicians began to appreciate its nature. Thomassin, Boyer, Fournier, Montfils, Veson, Sancerotte, Chambon, and especially Enaux and Chaussier, contributed to make the medical world acquainted with the nature of malignant pustule. During the present century, Bayle, Bidault, Villiers, Reynier, Rayer, Branell, Wagner, Raimbert, Manoury, and Salmon, and more recently Bourgeois and Gaujot, have given valuable monographs of cases and epidemics. In the United States, it has at least twice prevailed epidemically: in the vicinity of Philadelphia in 1834-'6, and in Louisiana in 1837-'9. It is also

said to have prevailed in Louisiana soon after its settlement by the French. It is not known to have occurred in the northern portion of the United States otherwise than sporadically; unless, possibly, the "malignant erysipelas" which prevailed in the northern part of the state of New York in 1825 was a variety of malignant pustule; it was immediately preceded by a fatal epizootic of slavers among horses. In the same region, and just subsequent to an epizootic among horned cattle in 1842, there were several cases of genuine malignant pustule, yet no one seems to have recognized its source. Since that time, and it may be added since the common practice of feeding cattle on the refuse of distilleries and breweries, and the more general spread of epizootic diseases, particularly in the northern part of the United States, malignant pustule has become more common. Both of the epidemics referred to were in conjunction with epizootics.

PUTLITZ, *Gustav Heinrich Gans zu*, a German poet, born at Retzien, Prussia, March 20, 1821. He studied in Magdeburg, Berlin, and Heidelberg, and was employed in the civil service from 1846 to 1848. In 1863 he became director of the court theatre at Schwerin. His exquisite fairy poem, *Was sich der Wald erzählt* (Berlin, 1850; 32d ed., 1872), served as a model for many similar works, and was followed by *Vergissmeinnicht* (1851; 9th ed., 1872), *Die Halben* (1869), *Walpurgis* (1870), and *Funken unter der Asche* (1871). He has also written *Brandenburger Geschichten* (Stuttgart, 1862), *Novellen* (1863), and numerous dramas and comedies, the latter collected in many volumes, 1850-'69. His collected works appeared in 1872.

PUTNAM, the name of counties in nine of the United States. **I.** A S. E. county of New York, bordered W. by the Hudson river, E. by Connecticut, and watered by Croton river and Peekskill creek; area, 234 sq. m.; pop. in 1870, 15,420. Its surface is mountainous, several ranges crossing the county from S. W. to N. E., and the deep valleys are fertile. There are several beautiful mountain lakes, the principal of which are Mahopae, Canopus, and Gleneida. Iron, granite, limestone, and other minerals are found in the mountains, and there are many mines and quarries. It is traversed by the Hudson River and the New York and Harlem railroads. The chief productions in 1870 were 2,599 bushels of wheat, 89,934 of Indian corn, 49,673 of oats, 101,595 of potatoes, 33,671 tons of hay, 3,707 lbs. of wool, and 277,759 of butter. There were 2,184 horses, 10,220 milch cows, 1,480 working oxen, 2,141 other cattle, 2,119 sheep, and 2,015 swine; 3 flour mills, 3 paper mills, 2 founderies, and 5 manufactories of tin, copper, and sheet-iron ware. Capital, Carmel. **II.** A W. county of West Virginia, touching the Ohio with its W. corner, intersected by the Great Kanawha, and drained by its tributaries; area, about 350 sq. m.; pop. in 1870, 7,794, of whom 260 were colored. It has a

rough and hilly surface and a generally fertile soil, and contains extensive beds of iron ore and bituminous coal. The Chesapeake and Ohio railroad crosses the S. corner. The chief productions in 1870 were 40,020 bushels of wheat, 232,126 of Indian corn, 49,879 of oats, 28,090 of potatoes, 472,765 lbs. of tobacco, 14,992 of wool, 63,061 of butter, and 19,541 gallons of sorghum molasses. There were 1,463 horses, 1,565 milch cows, 3,035 other cattle, 6,291 sheep, and 6,999 swine. Capital, Winfield. **III.** A central county of Georgia, bordered E. by the Oconee and drained by Little river and several creeks; area, about 350 sq. m.; pop. in 1870, 10,461, of whom 7,445 were colored. It has a nearly level surface, abounding with forests of oak and pine, and a soil naturally fertile. The Milledgeville branch of the Central railway of Georgia terminates at Eatonton. The chief productions in 1870 were 11,040 bushels of wheat, 160,661 of Indian corn, 7,872 of oats, 14,848 of sweet potatoes, 7,326 bales of cotton, 3,328 lbs. of wool, and 29,047 of butter. There were 464 horses, 1,100 mules and asses, 1,541 milch cows, 465 working oxen, 2,250 other cattle, 1,538 sheep, and 4,346 swine. Capital, Eatonton. **IV.** An E. county of Florida, bounded E. by St. John's river and drained by its tributaries; area, 610 sq. m.; pop. in 1870, 3,821, of whom 1,334 were colored. The surface is low and level, and the soil fertile. It contains several small lakes. The chief productions in 1870 were 16,592 bushels of Indian corn, 11,673 of sweet potatoes, 162 bales of cotton, 1,125 lbs. of rice, and 4,823 gallons of molasses. There were 1,055 milch cows, 5,526 other cattle, 360 sheep, and 2,710 swine. Capital, Palatka. **V.** A N. county of Tennessee, drained by affluents of the Cumberland river; area, about 500 sq. m.; pop. in 1870, 8,698, of whom 530 were colored. It has a hilly surface, and much of it is covered by forests. The chief productions in 1870 were 39,330 bushels of wheat, 332,254 of Indian corn, 37,854 of oats, 17,367 of Irish and 11,581 of sweet potatoes, 131,856 lbs. of tobacco, 19,092 of wool, 125,938 of butter, 18,945 of honey, and 17,772 gallons of sorghum molasses. There were 2,218 horses, 2,166 milch cows, 1,364 working oxen, 2,865 other cattle, 10,460 sheep, and 21,568 swine. Capital, Cookville. **VI.** A N. W. county of Ohio, drained by Auglaize river and its tributaries, the Ottawa and Blanchard's fork; area, about 500 sq. m.; pop. in 1870, 17,081. It has a level surface, is covered with large tracts of timber, and its soil is fertile. It is intersected by the Cincinnati, Hamilton, and Dayton railroad. The chief productions in 1870 were 237,586 bushels of wheat, 434,948 of Indian corn, 105,896 of oats, 70,527 of potatoes, 16,331 tons of hay, 78,605 lbs. of wool, 330,078 of butter, 14,098 of maple sugar, and 12,801 gallons of sorghum molasses. There were 5,437 horses, 5,242 milch cows, 7,191 other cattle, 23,269 sheep,

and 15,466 swine; 8 manufactories of carriages and wagons, 1 woollen mill, 6 flour mills, and 14 saw mills. Capital, Ottawa.

VII. A W. county of Indiana, drained by a branch of Eel river and several creeks; area, 486 sq. m.; pop. in 1870, 21,514. It has an undulating surface and fertile soil. It is intersected by the Indianapolis and Illinois canal and several railroads. The chief productions in 1870 were 297,797 bushels of wheat, 988,919 of Indian corn, 68,565 of oats, 57,710 of potatoes, 15,990 tons of hay, 125,320 lbs. of wool, 332,383 of butter, 33,289 of maple sugar, and 21,207 gallons of sorghum molasses. There were 8,274 horses, 2,416 mules and asses, 5,729 milch cows, 19,236 other cattle, 34,227 sheep, and 26,777 swine; 16 manufactories of carriages and wagons, 3 of furniture, 2 of curried leather, 3 of pumps, 6 of tin, copper, and sheet-iron ware, 3 founderies, 1 woollen mill, 4 flour mills, and 16 saw mills. Capital, Greencastle.

VIII. A N. central county of Illinois, intersected by the Illinois river and drained by its branches; area, 200 sq. m.; pop. in 1870, 6,280. It has an undulating surface and fertile soil. It is traversed by the Chicago, Rock Island, and Pacific railroad. The chief productions in 1870 were 28,933 bushels of wheat, 334,259 of Indian corn, 86,519 of oats, 73,707 of potatoes, 10,571 lbs. of wool, 47,699 of butter, 4,916 gallons of sorghum molasses, and 5,080 tons of hay. There were 2,420 horses, 1,406 milch cows, 2,899 other cattle, 1,987 sheep, and 5,431 swine. Capital, Hennepin.

IX. A N. county of Missouri, bordering on Iowa, bounded E. by the Chariton river and drained by its branches; area, about 550 sq. m.; pop. in 1870, 11,217, of whom 9 were colored. It has an undulating surface, diversified by prairies and forests, and a fertile soil. The chief productions in 1870 were 62,308 bushels of wheat, 458,582 of Indian corn, 146,152 of oats, 34,979 of potatoes, 12,911 tons of hay, 39,200 lbs. of tobacco, 63,800 of wool, 194,098 of butter, 10,885 of cheese, 26,365 of honey, and 32,483 gallons of sorghum and 14,731 of maple molasses. There were 5,329 horses, 515 mules and asses, 4,137 milch cows, 9,351 other cattle, 26,227 sheep, and 21,789 swine. Capital, Unionville.

PUTNAM, Israel, an American soldier, born in the part of Salem now constituting the town of Danvers, Mass., Jan. 7, 1718, died in Brooklyn, Conn., May 19, 1790. He was the 11th in a family of 12 children, and in his boyhood was noted for his physical strength and bravery; but he had few educational advantages. On coming of age he bought a farm in Pomfret, Conn., and fixed his residence there. Here occurred his famous encounter with a she wolf that had for several years preyed upon the flocks and cattle of the neighborhood. Having discovered her den, Putnam entered it alone by creeping into a narrow opening, and shot and killed the wolf as she was advancing to attack him. This adventure, which gave

him a wide reputation for courage, took place when he was 25 years old. The next 12 years he spent as a careful and successful farmer. In 1755 he was appointed by the legislature a captain in Col. Lyman's regiment, and formed a strong company from among his neighbors, who were employed chiefly on special service as rangers. His first expedition was under Sir William Johnson against Crown Point. In 1756 he was reappointed under his old commander Lyman, and in 1757 the legislature of Connecticut gave him the commission of major. Perhaps the most important service rendered by him during that year was the saving of the powder magazine of Fort Edward at the conflagration of the barracks. For an hour and a half he contended with the fire, and he was severely burned in his efforts to arrest its progress. In 1758, to escape from a strong party of Indians, he descended with a few men the falls of the Hudson at Fort Miller in a bateau. The savages with admiration beheld him unharmed by their balls steering his boat down rapids never before passed. The same year, when returning to Fort Edward from an expedition to watch the enemy in the neighborhood of Ticonderoga, his corps was surprised by a party of French and Indians, and he himself captured and bound to a tree. While in this situation a battle between his own party and the enemy raged around him for an hour, the tree being for part of the time in the hottest fire. At length the French and Indians were forced to retreat, but carried with them their captive, whom the savages determined to roast alive. He was tied to a tree, and the fire was already blazing, when his life was saved by the French commander, Molang. The next day he was taken to Ticonderoga, and afterward to Montreal, where among other prisoners he met Col. Peter Schuyler, through whose intervention he was treated according to his military rank and exchanged. In 1759, having meanwhile been made lieutenant colonel, he served under Gen. Amherst. In 1762 he commanded a Connecticut regiment in the expedition against Havana. In 1764 Putnam, now a colonel, at the head of 400 Connecticut men accompanied Col. Bradstreet to Detroit in the Pontiac war. For some years afterward he kept an inn at Brooklyn, the capital of Windham county, and during the same period frequently represented the town in the legislature. In 1773 he was engaged in the expedition that went up the Mississippi to survey a tract above Natchez for settlement. In the revolutionary war Putnam from the beginning embraced zealously the cause of the colonists. In April, 1775, at the alarm occasioned by the battle of Lexington, he left his plough in the field, turned loose the oxen, and rode to Boston in one day, a distance of 68 m. Learning that the British were besieged in Boston, he went to Hartford to meet with the legislature, of which he was a member. Being elected by that body brigadier general, he promptly gath-

ered and organized a regiment, and after drilling them for some days marched to Cambridge. The British officers offered him a commission as major general in the royal service and a large sum of money, both of which he indignantly rejected. In May he led a battalion of 300 men to Noddle's island, now East Boston, and burned a British schooner, captured a sloop, killing and wounding 70 of the enemy, and brought off several hundred sheep and cattle. It was in great measure through his wish to bring on a general engagement while the spirit of the troops was high, that the determination was taken to fortify Bunker hill. In the battle which followed he acted a conspicuous part. When Washington arrived at the camp to take command in July, he brought with him commissions from congress for four major generals, one of whom was Putnam; and to him alone did he deliver his commission, the others being withheld on account of the general dissatisfaction attending these appointments. In March, 1776, Washington being about to take possession of Dorchester heights, Putnam was ordered to attack Boston with 4,000 men in case the enemy should attempt to dislodge the Americans. Soon after the evacuation of that city he was ordered to take command in New York. He participated in the battle of Long Island, Aug. 27, and afterward went to Philadelphia to prepare for the defence of that place. After completing the necessary fortifications, he was stationed at Crosswick and subsequently at Princeton. In May, 1777, he was ordered to take command in the highlands of New York. While there he sent the following famous reply to Sir Henry Clinton, who claimed a lieutenant of a tory regiment as an officer in the British service: "Edmund Palmer, an officer in the enemy's service, was taken as a spy lurking within our lines; he has been tried as a spy, condemned as a spy, and shall be executed as a spy, and the flag is ordered to depart immediately. Israel Putnam. P. S. He has been accordingly executed." In the summer of this year the British troops surprised and took Forts Montgomery and Clinton, and obliged Putnam to retire to Fishkill. Subsequently he was removed from his command in the highlands, as Washington says, "on account of the prejudices of the people," and the dissatisfaction of Hamilton and other officers, and also from the fact that a court of inquiry had been ordered to investigate the causes of the loss of Forts Montgomery and Clinton. This court decided unanimously that no blame could be attributed to Putnam, who not long afterward was stationed in Connecticut. In March, 1779, a corps of 1,500 British troops under command of Tryon made an incursion into that state and approached Horseneck, one of Putnam's outposts. To oppose him were 150 men with two pieces of artillery, and with these Putnam took his position on the brow of a steep hill. After exchanging shots, as he saw

the enemy's dragoons were about to charge, he ordered his men to retire to a swamp inaccessible to cavalry. He himself was hotly pursued, and finding that the dragoons were gaining upon him, he rode down a steep declivity, receiving on his passage a ball through his hat. Riding on to Stamford, he called out the militia, and effecting a junction with his little party he hung upon the rear of Tryon in his retreat and took about 50 prisoners, whom he treated with a humanity customary on his part, but so unexpected that the British general sent him a letter of thanks. During the summer of 1779 Putnam held command of the Maryland, Pennsylvania, and Virginia troops in the highlands of New York, and, assisted by his cousin Rufus Putnam and others, completed the fortifications at West Point. After the army went into winter quarters, he returned home, and on setting out again for camp was attacked by paralysis of his left side. He then took up his residence on his farm in Brooklyn, and there remained until his death. He was of medium height and of great physical strength; and decision and personal daring were his most marked characteristics. "He dared to lead where any dared to follow," is the inscription upon his tombstone. His life is contained in the "Miscellaneous Works" of Gen. David Humphreys (New York, 1790), and in Sparks's "American Biography," vol. vii., by O. W. B. Peabody.

PUTNAM, Mary Lowell, an American authoress, daughter of the Rev. Dr. Charles Lowell, born in Boston, Dec. 3, 1810. She was married April 5, 1832, to Samuel R. Putnam, a merchant of Boston, who died in 1861. She possesses a remarkable knowledge of languages, comprising not only Latin, Greek, and Hebrew, and the modern tongues of western Europe, but Swedish, Danish, Polish, Russian, Hungarian, Turkish, Sanskrit, and other oriental tongues. She has published "Record of an Obscure Man" (Boston, 1861); a dramatic poem in two parts, "Tragedy of Errors" and "Tragedy of Success" (1862); and a memoir of her son William Lowell Putnam, killed at the battle of Ball's Bluff in 1861.

PUTNAM, Rufus, an American pioneer, cousin of Gen. Israel Putnam, born in Sutton, Mass., April 9, 1738, died in Marietta, O., May 1, 1824. In 1757 he enlisted in the war against the French, and in 1760 was made ensign. He afterward worked as a farmer and millwright, and in 1773 went on an expedition to the newly created government of West Florida. In 1775 he entered the continental army as lieutenant colonel, in 1776 was appointed engineer with the rank of colonel, and in 1777 commanded a regiment in the Massachusetts line. He constructed the fortifications at West Point, and in January, 1783, was commissioned brigadier general. He removed to Rutland in 1782, and for several years was a member of the legislature and employed in government surveys. After a visit to the Ohio country he called and

presided over a convention that met in Boston on March 1, 1786, and formed the Ohio company, of which he was made a director. The company bought 1,500,000 acres of government land, and Putnam landed at the mouth of the Muskingum on April 7, 1788, and laid out the city of Marietta, the first permanent settlement in Ohio. In 1790 he was appointed judge over the territory N. W. of the Ohio, and in 1796 surveyor general of United States lands. In May, 1792, he had been appointed a brigadier general in the United States army, and commissioned to make a treaty with the tribes on the Wabash. In 1803 Jefferson removed him from the surveyorship, and in the same year he was a member of the convention which framed the Ohio state constitution.

PUTREFACTION. See FERMENTATION, vol. vii., p. 144.

PUTTY, a kind of cement used for filling cavities in cabinet and carpenter's work, for fastening window panes in sashes, and kindred purposes. Ordinary glazier's putty is made of whiting (finely levigated chalk) and boiled linseed oil, kneaded into a doughy mass and beaten with a mallet. The addition of a small quantity of tallow prevents its getting too hard. French putty is made by boiling 4 lbs. of brown umber in 7 lbs. of linseed oil for about two hours, adding 2 oz. of melted wax, 5½ lbs. of whiting, and 11 lbs. of dry white lead, mixing well. This putty is very durable.

PUVIS DE CHEVANNES. See supplement.

PUY, Le, a town of France, capital of the department of Haute-Loire, 270 m. S. S. E. of Paris; pop. in 1872, 19,532. It is at the junction of the valleys of the Loire, Borne, and Dolaison, and is one of the most picturesque towns of France. It is on the steep southern acclivity of Mont Anis, which is crowned by a mass of volcanic rock with a flat top, called *Rocher de Corneille*. On this was erected in 1860 a colossal statue of the Virgin, made from 213 iron cannon captured at Sebastopol. The principal part of the town occupies a series of terraces. The cathedral, a fine Romanesque building of the 10th century, is reached by a stairway of 118 steps. Le Puy has also two ecclesiastical seminaries, a lyceum, normal school, public library, museum, theatre, and institutions for the deaf and dumb and the blind. It manufactures lace, bells, and clocks.

PUY-DE-DÔME, a S. central department of France, in Auvergne, bordering on Allier, Loire, Haute-Loire, Cantal, Corrèze, and Creuse; area, 3,073 sq. m.; pop. in 1872, 566,463. It is traversed by the Forez mountain, branches of the Cévennes, and the Auvergne group, among the highest summits of which are the Puy de Dôme, nearly 5,000 ft., and Mont Dor or Dore, more than 6,000 ft. There are many extinct volcanoes. The chief river is the Allier. A large part of the surface consists of the fertile valley of Limagne. Mineral springs, lead, antimony, coal, and timber abound. The soil, though stony, is pro-

ductive, particularly in the north; there are large orchards, vineyards, and chestnut plantations. It is divided into the *arrondissements* of Ambert, Clermont-Ferrand, Issoire, Riom, and Thiers. Capital, Clermont-Ferrand.

PUZZLES. See supplement.

PYAT, Félix, a French author, born in Vierzon, department of Cher, Oct. 4, 1810. He studied law in Paris, and was admitted to the bar in 1831, but devoted himself entirely to literature and politics. He contributed to several journals, furnished Jules Janin with one of the most striking chapters of his *Barnave*, and was connected as *feuilletoniste* with the *Siècle*, and afterward for several years as political editor with the *National*. His first play, composed in conjunction with Théodore Burette, *Une révolution d'autrefois*, was brought out at the Odéon, March 1, 1832, but was suppressed at once on account of its bold political allusions. *Une conjuration d'autrefois*, printed in 1833 in the *Revue des Deux Mondes*, and *Arabella*, in which, under assumed names, he branded the supposed accomplices in the death of the duke of Bourbon, were of a similar political character. In conjunction with Luchet, he produced in 1834 *Le brigand et le philosophe*, and in 1835 *Ango*. Politics now engaged his attention for about six years. In 1841 his *Deux serruriers* had an extraordinary run; and his *Cedric le Norvégien* (1842), *Diogène* (1846), and *Le chiffonnier* (1847), his last play, were also successful. In 1844, for a violent pamphlet, *Marie Joseph Chénier et le prince des critiques*, against his former friend Jules Janin, he was sentenced to six months' imprisonment. He left the *National* for the more revolutionary *Réforme*, and on the proclamation of the republic in 1848 sided with the socialists. Elected to the constituent assembly, he became one of its secretaries, and voted with the party of the mountain. After his reelection in 1849, he signed Ledru-Rollin's "Appeal to Arms," June 13, accompanied him to the *conservatoire des arts et métiers*, and making his escape first took refuge in Switzerland, and then removed to Belgium, where he occasionally wrote political pamphlets, became connected with the "European revolutionary committee," and wrote an apology for the attempt to assassinate Napoleon III. He refused to profit by the amnesty granted by the emperor in 1859; but after that of 1869 he returned to France. In the same year, however, he was again forced to conceal himself on account of prosecutions brought against him for articles in the *Rappel*. At first he remained in hiding in Paris, but after the plebiscitum of May, 1870, more vigorous measures were taken against him, and he escaped to London. He was found guilty of taking part in various revolutionary conspiracies, and although safe from arrest was sentenced *in contumaciam* to five years' imprisonment and a heavy fine. On the fall of the empire Pyat returned to Paris, and during the German siege edited the *Combat* and the *Ven-*

geur. After the surrender he was elected to the national assembly from one of the city districts; but he appeared only once at the debates. On the outbreak of the insurrection of the commune (March 18, 1871), he was chosen a member of the communal body by the tenth Paris arrondissement. Here his course, throughout the insurrection, was very arbitrary. Most of the acts of violence were supported by him, and he was chiefly instrumental in the suppression of many of the Paris journals for articles which he deemed hostile to the commune's rule. He was successively a member of the first executive committee of the commune, of several special commissions, and of the committee of public safety, under whose rule the last acts of the communists were perpetrated. On the capture of Paris by the Versailles troops he made his escape, and has since lived chiefly in London. Here, in June, 1874, after the artist Courbet had been condemned to pay the cost of reërecting the column Vendôme, Pyat published a protest, assuming himself all responsibility for the decree under which the column was destroyed.

PYDNA (now *Kitro*), an ancient town of southern Macedonia, near the W. shore of the Thermaic gulf. It was a Greek colony, but was repeatedly subjected by the Macedonian kings, and finally by Philip, who enlarged and fortified it. Here Æmilius Paulus vanquished Perseus, the last king of Macedon (168 B. C.). Under the Romans it was also called Citrum or Citrus, from which its modern name is derived.

PYGMALION, a legendary king of Cyprus, whom the licentious conduct of his countrywomen so disgusted that he conceived a hatred against the whole sex. According to Ovid, he made an ivory female statue of such exceeding beauty that he fell desperately in love with it himself, and prayed to Venus to endow it with life. The goddess granted his request. Pygmalion then married the object of his affections, and by her had a son called Paphus, who founded the city of that name. (For another legendary Pygmalion, see *Dmo.*)

PYGMY, or *Pigmy* (Gr. *πυγμαῖος*, from *πυγμή*, the fist, or a measure extending from the elbow to the fist, equal to about 18½ inches), the name of a nation of dwarfs believed by the ancients to inhabit the interior of Africa. They were supposed to be about three spans high, and according to the favorite story they were engaged in constant war with the cranes, their inveterate enemies. Herodotus speaks seriously of them (ii. 32) as an existing race; and many recent commentators have believed that the accounts from which he took his information had confounded a small species of African apes with men. The story of a pygmy race was universally regarded as entirely fabulous until a very recent period. Dr. Krapf, a German missionary, was (about 1850) the first to revive the old myth, in accounts of a tribe of dwarfish negroes of which he had heard in the unexplored part of S. E. Africa. Du Chailu's

explorations enabled him to give still more definite statements, which were long doubted, but the mystery surrounding the subject was finally cleared away by the discoveries of Dr. Georg Schweinfurth. In the country of the Monbuttoos, between lat. 3° and 4° N. and lon. 28° and 29° E., during a long time passed at the king's residence (1870) he was brought into actual communication with a considerable number of people from a pygmy race, inhabiting a district nearly corresponding to that indicated by the ancient story. The first of the pygmies whom he examined was brought by the Monbuttoos to his tent. Dr. Schweinfurth says: "With his own lips I heard him assert that the name of his nation was Akka; and I further learnt that they inhabit large districts to the south of the Monbuttoo, between lat. 2° and 1° N. A portion of them are subject to the Monbuttoo king, who, desirous of enhancing the splendor of his court by the addition of any available natural curiosities, had compelled several families of the Akka to settle in the vicinity." Schweinfurth soon after saw many other representatives of this strange colony, and even succeeded in carrying away one of them; but he died before the explorer reached the coast. No one of six specimens that he measured, some of whom were of advanced age, much exceeded 4 ft. 10 in. in height. Their heads were disproportionately large, their shoulders peculiar in shape, with crooked and singularly formed blades; the chest was flat and contracted above, but expanded below to support the belly, which Schweinfurth says is "huge and hanging." All the lower joints are angular and projecting except the knees, which are plump and round. The feet turn inward, and the Akka "waddle and lurch" in walking. The hands alone are remarkably well formed. The skulls of all examined were prognathous to an extraordinary degree, the facial angles of two of them being respectively 60° and 66°. They have a snout-like projection of the jaws, with an unprotruding chin; the upper part of the skull is wide and almost spherical. At the base of the nose there is an unusually deep indentation. Of their country he could only learn that it was scantily watered and probably flat; that it was politically divided among a considerable number of tribes; and that there were nine kings. (See *DWARF.*)

PYLOS, the name of three ancient towns of the Peloponnesus, on or near its western shore, one of which was in Hollow Elis, another in Triphylia, and the third and most important in Messenia, on the promontory of Coryphasium. The earlier city on the promontory was forsaken by the inhabitants after the close of the second Messenian war, and the promontory remained deserted until the Peloponnesian war, when in 425 B. C. it was fortified by the Athenian general Demosthenes. It became memorable for the defeat of the Spartans not long after, but at the close of the war passed again into the hands of the Lacedæmonians.

The town of Navarino is near the site of the old city, which is considered by most critics as the Pylos of Nestor. K. O. Müller, however, decides in favor of the Triphylian Pylos.

PYM, John, an English patriot, born at Brymore, Somersetshire, in 1584, died in London, Dec. 8, 1643. He was of a good family, and was educated at Pembroke college, Oxford, but left without taking his degree, and applied himself to the study of common law. He became a clerk in the office of the exchequer, entered parliament in 1614, and in 1620 became conspicuous as a leader of the country party. In 1621 he was one of the 12 commissioners sent to James I. at Newmarket in behalf of the privileges of parliament, and at the close of that year was sentenced with Coke, Philips, and Mallory to imprisonment for his opposition to the measures of the court. In the first parliament of Charles I. he was indefatigable in his support of the rights of the people, and in 1626 was one of the managers of the articles of impeachment against the duke of Buckingham. In 1639 he held communications with the commissioners sent to London by the Scotch Covenanters, and accompanied Hampden through the country to incite the people to send in petitions. In the short parliament of 1640 he was one of the most active members, and in the long parliament exerted great influence. On Nov. 11 he moved to impeach the earl of Strafford for high treason, and as one of the managers on the part of the house of commons he bore a prominent part in the proceedings which led to the execution of that minister. In the subsequent trial of Laud he also made a violent speech against the prisoner, and was the mover of the grand remonstrance, which enumerated the faults of the royal administration from the accession of Charles. He was one of the five members of parliament whom the king attempted in person to seize; and after the departure of Charles from London, he assisted in carrying on the executive branch of the government. Yet in 1643 he put forth a vindication of his conduct in answer to the charges brought against him, from which it was thought doubtful with which of the two parties then dividing the kingdom he would go. In November, 1643, just before his death, he was appointed lieutenant of the ordnance. He was buried in Westminster abbey.

PYNAKER, Adam, a Dutch painter, born at Pynaker, between Delft and Schiedam, in 1621, died in 1678. In his youth he resided for several years at Rome, where he acquired an ideal or pastoral style of landscape painting. His pictures contain charming effects of sunlight, with clear, warm skies, and trees and other natural objects are painted with a broad, free pencil, and great richness of color. The best of his works are of cabinet size, and many of these are owned in England.

PYRAMID (Gr. *πυραμῖς*), the geometrical term for any solid contained by a plane polygonal

base and other planes meeting in a point, applied to various monumental and temple structures of several nations. The most famous pyramids are those of the ancient Egyptians, and with few exceptions are the tombs of kings. The theories that they were astronomical monuments, or large storehouses, or, as Prof. Piazza Smyth holds, memorials of a system of weights and measures, intended to be universal, and built with the aid of divine inspiration, are not supported by the accounts of the ancients, nor by the Egyptian inscriptions and other testimony. The facts that the pyramids are found in the midst of a necropolis, that they contain sarcophagi and mummies, and that the inscriptions on the tombs of many priests mention as a special honor that the deceased officiated at the funeral services held at the pyramids, seem to prove that they are tombs and nothing else. As the Egyptian tombs have always borne one and the same character, and only the manner in which they were adorned varied with the tastes of the period, their age may be determined with great certainty. For the first eleven dynasties, or previous to about 3000 B. C., the tombs were in the form of a *mastaba*, or merely rectangular walls looking like unfinished pyramids, and their interior was richly decorated with sculptures and paintings, referring either to the life of the deceased or to the gods of the current religious system. During the middle empire, and until about 1600 B. C., the *mastaba* was superseded by small pyramids, and by the *speos* or halls cut into the rocks, and the divinities were seldom represented upon them. In the next period, until about 340 B. C., excavated tombs prevailed,



Mastaba of Meydoum.

and the statuary and images of the deceased were superseded again by those of a mythological nature. The pyramids are only enlarged *mastaba*, and belong as such to the first period. Each one was commenced over a sepulchral chamber excavated in the rock, and

to wall. It is 34 ft. 3 in. long, 17 ft. 1 in. wide, and 19 ft. 1 in. high. Over it are five small chambers (*l*), apparently built to shelter the larger room beneath from the weight of the masonry. The room is perfectly plain, and contains only a sarcophagus of red granite, 7½ ft. long, 3 ft. 3 in. wide, and 3 ft. 5 in. high, which is too large to have been introduced through the entrance passage, and must therefore have been placed in the room when this was built. It contained a wooden coffin with the mummy of the king, which disappeared when the pyramids were first opened and plundered. In the construction of the pyramids arrangements were made for blocking up the important passages with huge masses of granite, and the obstacles thus interposed have greatly impeded their exploration, and sometimes rendered it necessary to open new passages past the obstructions. It is probable that on account of these extraordinary precautions there are yet undiscovered apartments in the immense body of these structures. Niebuhr (1761), Davison (1763), the French expedition (1798), Hamilton (1801), Cavigliasi (1817), Belzoni (1818), and Col. Howard Vyse (1837) penetrated into the interior; but a forcible passage had been effected into the pyramid long before any of these visits. It is not improbable that the Egyptians themselves violated the tomb of Cheops, or that Cambyes entered it; but Arab historians record that the caliph Mamoun, in the beginning of the 9th century, forced his way into the pyramid in order to rob it of its supposed treasures. Unable to discover the hidden entrance, he caused a passageway to be broken through the masonry on the north side (*k*), and thus reached the passage coming from above. He found nothing but empty chambers, and a stone sarcophagus, containing another of wood, which held a richly decorated mummy.—The second pyramid, King Shafra's, stands on a base 33 ft. above that of the great pyramid, and in an excavation made for it in the rock. It measured originally 707 ft. 9 in. on the sides, and was 454 ft. 3 in. high; but these dimensions are now reduced respectively to 690 ft. 9 in. and 447½ ft. The angle of its slope is 52° 20'. The upper portion of its casing is still preserved, and persons can ascend this, though not without danger, especially if liable to become dizzy by losing sight of the lower portion of the structure. This pyramid has two entrances, one 37 ft. 8 in. above the base, and the other built out in front of the base, each leading by an inclined passage about 100 ft. in length to the same sepulchral chamber. This has a roof of the shape of the pyramid itself, and measures 46 ft. 2 in. by 16 ft. 2 in., and is 19 ft. 3 in. high. It contains a granite sarcophagus 8 ft. 7 in. long, 3½ ft. wide, and 3 ft. high. It was reached with great difficulty by Belzoni in 1818, who found a Cufic inscription recording the visit of a caliph and the opening by him

of the pyramid, A. D. 1196–7. The only remains met with were those of a bull. The third pyramid is only 354½ ft. square and 203 ft. high, but was originally 219 ft. high. It was explored in 1837 by Col. Vyse, who discovered several apartments, in one of which were a highly finished sarcophagus, a mummy case bearing the name of King Menkara, and the body of a workman. The last two are now in the British museum, but the sarcophagus was lost on the passage. This pyramid, though the smallest, is the best constructed of the three, and indeed the style of the work is more costly than that of any of the other pyramids of Egypt. In the same vicinity are six smaller pyramids, supposed to have been the tombs of some of the relatives of the kings who constructed the larger ones, and an immense number of tombs, some built up above the surface, some excavated in the rock, and some subterranean channels. Near the great pyramids is also the famous sphinx.—Of the other pyramids further S., the largest are of the Dashed group, of which there are five, two of stone and three of rough brick. One of the former is now reduced from 719½ to 700 ft. square, and from 342½ to 326½ ft. high, and the other is 616½ ft. square and 319½ ft. high. Abusir has a group of 14 pyramids, but many of them are small and mere heaps of rubbish, and only two are more than 100 ft. high. The Sakkara field of pyramids is adjacent to that of Abusir, and contains 17 pyramids more or less preserved. The most remarkable and largest in this group is the pyramid in steps, which possibly may once have been as smooth as the other pyramids, but none of the stones which formerly filled the gaps are to be seen. Its situation in the immediate vicinity of the oldest portion of the city, its rude construction, and its oblong rectangular form, originally measuring 351 ft. from N. to S. and 393 ft. from E. to W., indicate a very high antiquity. Its nucleus is still standing, and rises 190 ft. above the level of the desert, in five distinct portions. Instead of facing the cardinal points, it is turned 4° 35' to the east, which seems to show that its erection dates from a time when the rules for the exact astronomical construction had not been discovered. Egyptologists adduce many reasons for considering this pyramid either the tomb of Unephes or the oldest burial place of Apis. As both Apis bones and the remains of royal mummies have been found in it, the pyramid may have served first as the tomb of kings, and been afterward appropriated for the service of Apis. The other pyramids of Sakkara are almost entirely destroyed. One of them, an enormous mastaba, the Mastaba el-Faraon, has recently been entered by Mariette Bey, who discovered an inscription dedicating the tomb to King Unas, of the fifth dynasty. Among the minor fields of pyramids is that of Abu Roash, a village two hours from Gizeh, where there are three which evidently date from the earliest dynasties. But

generally speaking there is little of interest in the pyramids outside of Gizeh, Abusir, Sak-kara, and Dashoor.—Pyramids are frequently met with in the upper part of the valley of the Nile. There are many in Nubia about lat. 17° and 18° N., the sepulchres of the monarchs of Meroë and of Ethiopia; a single group N. of Jebel Barkal comprises 120. Others are met with in other ancient countries of the East. At Birs Nimrud is the step-shaped pyramid built by Nebuchadnezzar of bricks of different colors, known as the temple of seven spheres. This was 235 ft. high with a perimeter of 2,286 ft. The same monarch built the pyramidal brick structure of Mujellibe at Babylon, the ruins of which still remain. At Benares in India are also the ruins of pyramids; and others were built in ancient times at Peking, and again at Suka in Java. At Rome one was constructed 20 or 30 years B. C., in honor of C. Cestius, in imitation of the Egyptian monuments, and furnished with a sepulchral chamber; it is 120 ft. high on a base of 95 ft. diameter, built of hewn stone and marble-faced.—In Mexico are similar structures far exceeding in the area they cover the dimensions even of the great pyramid of Egypt. These monuments, called *teocallis*, literally “houses of God,” are pyramids in terraces with flat tops, and surmounted by a chamber or cell, which is the temple itself. They seem to be of all ages; that of Cholula is, according to tradition, as early as the Toltecs, while the great *teocalli* of the city of Mexico was finished only five or six years before the discovery of America by Columbus. (See CHOLULA, and Mexico, vol. xi., p. 483.) There are two pyramids at Teotihuacan, the largest of which is apparently a square of 645 ft. with a height of 171 ft., and there are others at Tezucuo of about the same dimensions, and like them divided into five or seven stories; but the most interesting of those yet brought to light is that of Xochicalco, on account of its sculptures and architectural ornaments. There are in Mexico also numerous pyramids of one story, but, like that of Oajaca, they are only devices to raise a temple to such a height as would enable the people to witness the ceremonies performed around it. While Egyptian pyramids are always tombs, and terminate in a point, without steps leading to the apex, the Mexican are always temples, and in terraces, with the upper platform crowned by a chamber or cell. Similar to the latter were the Assyrian pyramids, and the object of their construction was the same. In fact this form of temple has been found from Mesopotamia to the Pacific ocean. The resemblance has given rise to many theories on the racial connection of the builders, and Fergusson says: “If we still hesitate to pronounce that there was any connection between the builders of the pyramids of Suku and Oajaca, or the temples of Xochicalco and Boro Buddor, we must at least allow that the likeness is startling and difficult to account for on the theory of mere

accidental coincidence.”—See Vyse’s “Operations carried on at Ghizeh in 1837” (3 vols., London, 1840–’42), and Piazzzi Smyth’s “Life and Work at the Great Pyramid” (3 vols., Edinburgh, 1867). Excellent accounts of the Egyptian pyramids will be found also in Prokesch-Osten’s *Nilfahrt* (Leipsic, 1874), and in the new edition of Brugsch Bey’s *Histoire d’Égypte* (Leipsic, vol. i., 1875).

PYRAMUS AND THISBE, a youth and maiden of Babylon, celebrated in Ovid’s *Metamorphoses*. Their parents opposed their union, but the lovers, living in adjoining houses, found means to converse with each other through a hole in the wall, and once made an agreement to meet at the tomb of Ninus. There Thisbe arrived first, but, terrified by a lioness which had just torn to pieces an ox, she hid herself in a cave, and in her flight lost her mantle, which was rent by the lioness and soiled with blood. When Pyramus came and found the garment torn and bloody, he imagined that Thisbe had been killed, and thereupon fell upon his sword. When Thisbe returned and found the body of her lover, she slew herself with the same sword. This tragedy was enacted under a mulberry tree, the fruit of which, before white, has ever since been of the color of blood.

PYRENEES (Celt. *byrin*, a steep mountain), a mountain range of Europe, separating France from Spain, and extending from Capes Creus and Cervera on the Mediterranean to the S. E. angle of the bay of Biscay. The divisions of the two countries along the boundaries are, beginning at the east: in France, the departments of Pyrénées-Orientales, Ariège, Haute-Garonne, Hautes-Pyrénées, and Basses-Pyrénées; in Spain, Catalonia, Aragon, Navarre, and Guipúzcoa. The Pyrenees form the eastern half of the great northern barrier of the Iberian mountain system, their prolongation, the Cantabrian mountains, stretching to Cape Finisterre, the N. W. point of the peninsula. On the N. E. the Cévennes form a connecting link with the Alps. The direction of the chain is from S. S. E. to N. N. W.; its length is about 250 m., and its greatest breadth, excluding some of the remoter slopes, about 70 m. Near the middle its axis is deflected by an elbow, so that the line of the western half, if prolonged, would run about 20 m. to the south of the eastern portion. The Pyrenees generally consist of two parallel main ridges, from which transverse spurs extend far on either side. The southern ridge is the more elevated. The chain is higher in the eastern than in the western portion, and attains its greatest altitude and extension in the centre. Here the double range encloses the valley of Arran, in which the Garonne takes its rise. Other streams break through the northern ridge, but the southern presents a vast unbroken wall. This main ridge lies S. of the political boundary, so that the loftiest peaks and most elevated passes belong to Spain. The highest summits are not found along this crest, but occupy projections

to the south. The mass of the Maladetta, on the frontiers of Aragon and Catalonia, presents the two peaks of Nethou or Anethou and Maladetta, the former the culminating point of the chain (11,160 ft.). Mont Perdu (10,994 ft.), called in Spanish *las Tres Sorores*, and the Cylindre de Marboré lie further to the west. To the north of these are the Pic Posets and Pic de Vignemale, the latter the highest summit of the Pyrenees in France (10,791 ft.). Among the other principal summits are the Tour de Marboré, Pic Long, Montcalm, Pic de Néouvielle, Pic du Midi de Bigorre, and Pic du Midi de Pau, most of them upward of 10,000 ft. high. Mont Canigou (9,134 ft.), near the E. extremity of the range, on the meridian of Paris, forms a bold projection in France. The summit line, very uniform for long distances, has a mean elevation of about 8,000 ft., the passes being as elevated as those in the Alps.—A remarkable feature of the Pyrenees is the almost complete absence of longitudinal valleys, the great depressions running transverse to the chain. These frequently meet near the crest, and form passes called *cols* or *ports*. Many of the valleys terminate abruptly in huge basins (*cirques* or *oules*) enclosed by perpendicular walls of rock, and often one basin is continued by others on a higher level in the manner of an amphitheatre, the streams descending from one into the other in magnificent cascades. There are about 12 such falls in the basin of Gavarnie, the descent of one being 1,400 ft. In places the peaks rise almost perpendicularly for thousands of feet, and the grandeur of the scenery is unsurpassed even in the Alps. The snow line is about 8,500 ft. on the N. side, and on the S. side about 1,000 ft. higher. The snow does not appear in continuous fields, but is rather confined to the summits. Glaciers, the existence of which was until recently unknown, extend on the N. slopes of the highest peaks, above an elevation of 7,000 ft. There are a number of small lakes on the side of France. The passes of the Pyrenees are very numerous, but only a few are practicable for carriages. The principal, beginning at the east, are: the col de Pertus, the great highway between Perpignan and Gerona; the col de la Perche; col de Puymorens; port de Salo; the pass of Viella; the port de Venasque; the port d'Oo; the Brèche de Roland (9,193 ft.), almost inaccessible to the experienced smugglers of these mountains; the port de Gavarnie; the port de Canfranc, between Oléron and Jaca; the pass of Roncesvalles, between St. Jean-Pied-de-Port and Pamplona, memorable for the defeat of Charlemagne (see RONCESVALLES); and the pass of the Bidassoa, leading through Irun. The railroad from Bayonne to Vitoria passes the western extremity. The greater part of the range forms an unbroken watershed between the Mediterranean and the bay of Biscay, but the eastern portion belongs exclusively to the basin of the Mediterranean. The

principal rivers flowing toward the north are the Adour, Garonne, Ariège, and Aude. The southern slope is tributary to the Ebro, which receives the Segre and other considerable streams, and to the Llobregat. The Bidassoa, which traverses the charming valley of Bastan, forms the westernmost portion of the boundary line. The opposite sides of the Pyrenees present a great contrast. Toward Spain the range rises in a succession of abrupt terraces, whose rugged faces support a scanty and stunted vegetation. On the side of France the descent is much more gradual. Here the spurs enclose fruitful valleys enriched with fine pastures and orchards, and extensive forests stretch far up the slopes, affording good timber for ship building.—The primary geological formations are granite, forming the nucleus of the chain, micaceous schist, and primitive limestone, which are flanked by bands of clay slate, graywacke, and blue limestone. Oolitic and chalk formations occur, and trap, basalt, and porphyry appear in scattered masses. The mineral wealth of the Pyrenees is great, embracing iron, copper, zinc, and lead, but only the first of these metals is extensively worked. The Ariège rolls particles of gold. The mineral springs, mostly sulphurous, have long been noted, the best known being those of Eaux Bonnes, Eaux Chaudes, Bagnères-de-Bigorre, Bagnères-de-Luchon, Barèges, and St. Sauveur, all in France. The climate is comparatively mild. The forest trees include the oak, beech, fir, yew, and pine, and in the more elevated regions are found the rhododendron, daphne, and willow. Among the wild animals are the bear, wolf, lynx, and the izard, a species of wild goat. The inhabitants of the mountains are a vigorous race. Toward the east the little republic of Andorra has long maintained an independent existence. The Basques inhabit the westernmost portion of the chain.—The Pyrenees have repeatedly been traversed by hostile armies, from the time of Hannibal, who is supposed to have passed by the col de Pertus, to the present century. In 1813 they were the scene of encounters between Wellington and Soult. The treaty between Louis XIV. and Philip IV., known as the peace of the Pyrenees, was concluded on an islet of the Bidassoa, Nov. 7, 1659.

PYRÉNÉES, Basses. See BASSES-PYRÉNÉES.

PYRÉNÉES, Hautes. See HAUTES-PYRÉNÉES.

PYRÉNÉES-ORIENTALES, a S. department of France, consisting chiefly of the old province of Roussillon, bounded N. W. by Ariège, N. by Aude, E. by the Mediterranean, and S. by Spain; area, 1,591 sq. m; pop. in 1872, 191,856. It is traversed by lofty ridges of the Pyrenees, especially in the south, and there are vast plains in the east, and many rapid streams. It abounds in minerals, is celebrated for its fine wines and excellent merino sheep and mules, and has productive fisheries. Fruit, grain, hemp, and flax are raised; and coarse cloth, cutlery, and leather are manufactured.

The commerce is chiefly with Spain. It is divided into the arrondissements of Perpignan, Céret, and Prades. Capital, Perpignan.

PYRITES (Gr. *πυρίτης*, from *πύρ*, fire), a name given to yellow sulphuret of iron because it struck fire with steel. The German name *Kies* is similar to that for flint, *Kiesel*, and in the earliest firearms the powder was ignited by a piece of pyrites, the use of flints being later. It is now extended to sulphurets of other metals, and also to certain arsenides and double compounds of metals with sulphur. There are three kinds of iron pyrites: cubic or yellow, marcite or white, and magnetic pyrites. The first two are isomeric, having the formula FeS_2 , but are not isomorphous. Cubic pyrites crystallizes in several monometric forms, of which the cube, octahedron, and dodecahedron are the chief; while marcite belongs to the trimetric or rhombic system. Magnetic pyrites when pure has the formula Fe_3S_4 , and crystallizes in the hexagonal system. Cubic or yellow pyrites, or mundie as it is called in Wales, is found in all geological formations, from the most ancient crystalline to recent alluvial. Very large cubes have been found in some of the Cornish mines, dodecahedrons 6 in. in diameter in the island of Elba, and large octahedral crystals at Persberg in Sweden; in Connecticut, at Lane's mine in octahedrons, and at Orange and Milford in cubes in chlorite state; and in Pennsylvania, at Cornwall, Lebanon co., in cubo-octahedrons an inch in diameter. Cubic pyrites is largely used in the manufacture of coppers and sulphuric acid, and in Sweden for obtaining sublimed sulphur; and enormous quantities are exported from Spain to Great Britain. Yellow pyrites, from its resemblance to the precious metal, by which many have been deceived, is sometimes called "fool's gold." In the chemical works of Yorkshire "coal brasses," as pyrites is called, are exposed in their beds, where by the action of air and moisture they are converted into coppers; heat is developed during the process. In the coal fields subterranean fires are sometimes kindled by the conversion of masses of pyrites into coppers. At Quarreltown in Renfrewshire, Scotland, is a deep hollow where about 100 years ago the ground fell from a subterranean fire thus kindled. The conversion of pyrites into coppers is more conveniently conducted by roasting. (See **SULPHUR**, and **SULPHURIC ACID**.) Copper pyrites (calcoppyrite of Dana) is the common copper ore of Cornwall, where from 10,000 to 12,000 tons of copper are smelted from 150,000 to 160,000 tons of ore. It is a double sulphuret of copper and iron, containing sulphur 34.9, copper 34.6, iron 30.5. It crystallizes in the dimetric system, often in tetrahedrons. Copper pyrites in massive crystals occurs at Ellenville, Ulster co., N. Y., composed of sulphur 36.65, copper 32.43, and iron 31.25. Fire pyrites is found in the Cornish mines having the following composition: sulphur 30.0, tin 27.2,

copper 29.7, iron 13.1. Leucopyrite (Dana) is an arsenide of iron, and mispickite is a sulphuret of arsenic.

PYRMONT, a watering place of Waldeck, Germany, on the Emmer, 34 m. S. W. of Hanover. It has chalybeate springs, is the capital of the county of Pyrmont (pop. in 1871, 7,588), and contains a fine palace, a large bathing establishment, and a gas grotto emitting deadly vapors.

PYROLIGNEOUS ACID (Gr. *πύρ*, fire, and Lat. *lignum*, wood), also called pyroligneous and wood vinegar, the compound mixture of the volatile products from the destructive distillation of woody matters, which when purified yield acetic acid, wood naphtha, creosote, tar, &c. The method of producing it is noticed in the article **ACETIC ACID**, vol. i., p. 62, as also its use in the crude state for furnishing compounds useful as mordants in calico print works, as pyrolignite of iron, alumina, &c. It has been applied to various other uses, as for example, in medicine, as an antiseptic and stimulant in a wash for gangrene and ulcers, although at present the more definite products, such as carbolic acid, are preferred. Its antiseptic qualities have led to its use in preserving articles of food, as herrings and other fish. The process is auxiliary to drying in the shade, which precedes the dipping of the articles in the acid. Herrings first cured by a sprinkling of salt left upon them for six hours, and then drained, being immersed a few seconds in pyroligneous acid and then dried for two months, are in an excellent condition for preservation and retain a smoky flavor. The addition of a quart of the acid to the common pickle for a barrel of hams will cause the hams to acquire this flavor as if they had been smoked in the ordinary way.

PYROMETER (Gr. *πύρ*, fire, and *μέτρον*, measure), any instrument for determining degrees of heat higher than those which can be measured by ordinary thermometers. Pyrometers are required in the determination of the intensity of the heat of furnaces, and in ascertaining at what temperatures metals melt and chemical compounds are formed or are decomposed. They may be arranged, according to the principles on which they act, in the following classes: 1, pyrometers using the expansion of solids as a means of measuring high temperatures, of which class Daniell's is a type; 2, those using the contraction of baked clay, as Wedgwood's; 3, those employing the expansion of air, as Pouillet's, Regnault's, and Jolly's; 4, those using the known melting points of solids; 5, those depending on the chemical decomposition of solids, as Lamy's; 6, those measuring temperatures by heating a known weight of water, by allowing to cool in it a known weight of platinum or other metal, which has been heated to the temperature of the space or of the body to be tested, as Pouillet's; 7, those which determine temperatures from the measures of the strength of

thermo-electric currents produced by heating the junction of two different metals, as Becquerel's; 8, those which determine temperatures by the measurement of changes, produced by heat, in the electrical resistance of a length of platinum wire, as Siemens's; 9, those which use the expansion of the wave length of a sound, which traverses a tube placed in the furnace whose temperature is to be measured, as Mayer's. We will restrict our detailed description to the three pyrometers which experience has shown to be most trustworthy, viz.: Daniell's pyrometer, the air pyrometer, and Siemens's pyrometer. Of the others we will give only general descriptions of the principles on which they depend. 1. The first pyrometer based on the expansion of solids appears to have been invented by Musschenbroek about 1730. This instrument, which he called a "pyrometer," was formed of a metallic bar, fixed at one end, and connected at the other with wheel work which multiplied the motion of elongation caused by the elevation of its temperature. This was improved by others, who directed their efforts principally to the mechanism by which the motion was communicated to the index. Many of these contrivances are described in the article "Thermometer and Pyrometer" in vol. ii. of the "Natural Philosophy" published in the "Library of Useful Knowledge" (London, 1832). Daniell's pyrometer, called by its inventor "the register pyrometer," was first described in the "Transactions of the Royal Society" for 1830. It consists of two parts, the register, fig. 1, and the scale, fig. 2. The register is a solid bar of black-lead earthenware, A, highly baked. In the axis of this a hole is drilled, reaching from one end of the bar to within half an inch of the other extremity. In this cylindrical cavity is placed a rod of platinum or of iron, *a a*, $6\frac{1}{2}$ in. long. Upon the top of the bar rests a cylindrical piece of porcelain, *c c*, long enough to project a short distance beyond the extremity of the black-lead bar, to serve as an index. It is confined in its position by a ring or strap of platinum, *d*, passing round the top of the black-lead tube, which is partly cut away at the top; the ring is tightened by a wedge of porcelain, *e*. When it is exposed to a high temperature, the expansion of the metallic rod, *a a*, forces the index forward to a distance equal to the



FIG. 1.
Daniell's
Pyrometer,
Register.

difference in the amount of expansion between the metallic rod and the black-lead bar, and when cool it will remain protruded to the same distance, which will be greater or less according to the temperature; the exact measurement of this distance is effected by the scale, fig. 2. This scale is in-

dependent of the register, and consists of two rules of brass, *f g*, joined together by their edges accurately at a right angle, and fitting square upon the two sides of the black-lead bar. Near one end of this double rule a small brass plate, *h*, projects at a right angle, which

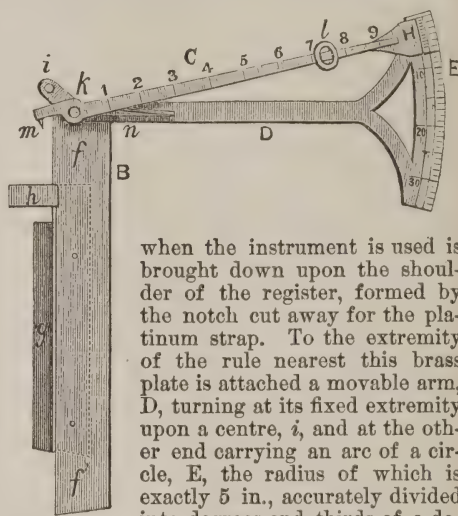


FIG. 2.
Daniell's Pyrometer,
Scale.

when the instrument is used is brought down upon the shoulder of the register, formed by the notch cut away for the platinum strap. To the extremity of the rule nearest this brass plate is attached a movable arm, D, turning at its fixed extremity upon a centre, *i*, and at the other end carrying an arc of a circle, E, the radius of which is exactly 5 in., accurately divided into degrees and thirds of a degree. Upon this arm, at the centre, *k*, another lighter arm, C, is made to turn, carrying upon the extremity of its longer limb a vernier, H, which moves on the face of the arc, and subdivides the graduation into minutes. The shorter arm, which is half an inch in length, crosses the centre, and terminates in an obtuse steel point, *m*, turned inward at a right angle. To use the instrument, the metallic rod is placed in the register, and the index is pressed firmly down upon its extremity and secured tightly by the platinum strap and the wedge. The position of the index is then read off on the scale, by placing the register in the reëntering angle for its reception, with the cross piece firmly held against the shoulder, and the steel point, *m*, resting on the top of the index, in a notch cut for it, which coincides with the axis of the rod. A similar observation, made after the instrument has been heated and allowed to cool, gives the value of the expansion. The scale of the pyrometer is compared with that of the mercurial thermometer, by observing the amount of expansion between two fixed points, such as the melting of ice and the boiling of mercury. In this pyrometer the temperature to which its register has been exposed is deduced from the amount of elongation of its metallic bar, on the supposition that the amount of elongation for an elevation of the same number of degrees is the same whether these degrees occur in the lower or in the highest regions of the thermometric scale. We now know, however, that the coefficient of expansion of a solid is not constant throughout the

range of available temperatures; hence, to obtain accurate measures with Daniell's pyrometer, it should be graduated by noting its indications at successive high temperatures, the thermometric values of which have been determined with an air thermometer. We should also be sure that successive heatings and coolings of the metallic bar do not change its coefficient of expansion. 2. Wedgwood's pyrometer, using the contraction of baked clay as a measure, consists of a metallic groove or gauge, the sides of which gradually converge; pieces of very pure clay are made into small cylinders, having one side flattened, and, being heated to redness, made just to fit the larger extremity of the groove. It is a property of clay permanently to contract and become harder by exposure to a high temperature, in consequence of its losing a portion of the water with which it is combined; and it was supposed that the amount of the contraction was exactly proportioned to the intensity of the heat to which it is exposed. The amount of contraction in the clay cylinders, after being exposed to the temperature which it was desired to measure, was easily determined by allowing the cylinders to slide from the top of the groove downward, till they arrived at a point beyond which they would not pass. Mr. Wedgwood divided the whole length of this gauge into 240 parts or degrees, each of which he calculated to be equal to 130° of Fahrenheit's scale; and the zero of his scale, indicating a red heat, corresponded, according to his experiments, to $1,077^\circ$. The difficulty of obtaining clay of uniform composition is of itself an almost insuperable objection to this method of estimating high temperatures; and it has been since ascertained that the observation upon which it is founded is not correct, for clay will contract as much by the long continuance of a comparatively low heat as by a short continuance of a high one. Hence the degrees of heat which Wedgwood's pyrometer has been applied to measure have been enormously exaggerated. Thus, Daniell's pyrometer shows that the melting point of cast iron is $2,786^\circ$, and the highest temperature of a good wind furnace about $3,300^\circ$; points which were estimated by Wedgwood at $20,577^\circ$ and $32,277^\circ$ respectively. In other words, Wedgwood's pyrometer gave figures nearly ten times higher than those obtained by Daniell's. 3. The expansion of air is used in pyrometers contrived by Pouillet, Regnault, and Jolly. If thermometers carefully made of any number of solids and liquids are all simultaneously exposed to the same successive elevations of temperature, it will be found that no two of them agree in their readings throughout the range of temperatures; but if we at the same time expose a set of thermometers made of the permanent gases (*i. e.*, of gases which have never been liquefied by pressure and cold), as oxygen, nitrogen, air, hydrogen, and carbonic oxide, we will find that they all agree in their readings.

For this reason, if for no other, these permanent gases should have the preference as bodies to form the expanding material of thermometers; but the theory of the thermodynamics of gases shows that from the expansion of these gases alone can we arrive at the knowledge of true temperatures. In short, it appears that while the coefficients of expansion of solids and liquids increase with the temperature, the permanent gases have the same coefficient of expansion, which also remains constant throughout the range of available temperatures. Indeed, men of science have agreed that the determination of temperature rests upon the assumption that the permanent, or, as they are now called, perfect gases, when subjected to a constant pressure, expand proportionately to the rise of temperature. This expansion, in the case of dry air, amounts for each degree centigrade to 0.003665 , or $\frac{1}{273}$ of the volume at 0°C. ; or what is the same, the pressure of a mass of air kept at a constant volume increases 0.003665 of its pressure at 0°C. for each rise of 1°C. in temperature. The simplest air thermometer, and the one best adapted to practical purposes, is that of Jolly. Its action depends on the law just given. A hollow globe of hard porcelain (platinum cannot be used by reason of its permeability to gases at high temperatures), A, fig. 3, communicates through the capillary tube E with the fixed vertical glass tube B. The tubes B and C and the connecting rubber tube contain mercury. The tube C moves upward and downward in a vertical direction, and carries with it the rubber tube D, and thus the surface of the mercury in B can always be brought to coincide with a mark, R, on the capillary tube E; so that the air in A and E is always observed under a constant volume after it has been heated to any temperature. The height of the mercury in C above R is read off on scales formed by cutting lines in the silvering of slips of glass mirrors placed behind the tubes C and R. When the centre of the pupil of the eye is seen in the plane passing through the surface of the mercury, we know that the line of sight is perpendicular to the length of the columns of mer-

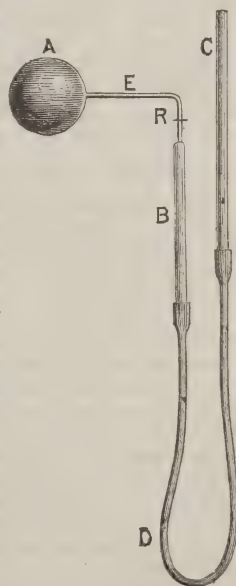


FIG. 3.—Jolly's Air Thermometer.

ry, and that their true difference of levels has been correctly determined. To graduate the apparatus, the globe is surrounded with melting ice and the mercury is brought to the level R in the tube E; then the height of the barometer, b_0 , and the height, h_0 , of the mercury in C above the level R in E, are observed. We will call $b_0 + h_0 = H_0$. The heights b_0 and h_0 must be reduced to what they would be if the mercury in the apparatus were at 0° C. To measure any temperature, t , we expose the globe to this temperature for a length of time sufficient to heat uniformly the contained air, which is known to be the case when the mercury is stationary in B and in C. When this condition has been reached we obtain the height h , which is the difference of the readings of the levels of mercury at R and in C reduced to 0° C., and then read the height b of the barometer reduced to 0° C. Calling $h + b = H$, we have for the sought tempera-

ture $t = \frac{H + H_0}{.003665 H_0 - 3c H}$, in which formula $3c$

is the cubical expansion of the porcelain or other material forming the globe. In this formula the volume of air contained in the capillary tube E, up to the mark R, is neglected; but when the most accurate determinations are desired, it must be remembered that this portion of air in the pyrometer remains at or about the temperature of the air surrounding the part of the apparatus outside of the furnace. This temperature, which we will call t' , can be determined by means of a thermometer placed close to the tube E. Now to obtain the exact value of the temperature to which the globe has been exposed, we must add to the value of t as given above the following correction: $t \cdot \frac{v}{v'} \cdot \frac{H}{H_0} \cdot \frac{1}{1 + .003665 t'}$,

in which expression v represents the volume of the globe, v' the volume of the capillary tube from its junction with the globe up to the mark R, and t' the reading of the thermometer contiguous to the tube E. The ratio $\frac{v}{v'}$ is found

by determining the weight of the globeful of mercury up to the junction with it of the capillary tube, and the weight of the mercury in the capillary tube from its junction with the globe to the point R. If p be the weight of the mercury in the globe alone, and P the weight when both globe and capillary tube are filled up to the mark R, then $\frac{v}{v'} = \frac{P-p}{p}$. The

determinations thus made with the air pyrometer are universally accepted as standards with which to test all other methods of pyrometry, and the confidence placed in any pyrometer increases with the constancy and closeness of its agreement with the determinations made with the air pyrometer. 4. The range and accuracy of pyrometers using the melting points of solids are limited to the number of metals and definite alloys whose melting points have been determined with precision. The method

evidently gives only successive steps in elevation of temperature. Some of these steps according to the determinations of fusibility by Pouillet, who used an air pyrometer in his experiments, are given in the article FUSIBILITY.

5. The method of pyrometry by the chemical decomposition of solids is described in the article DISSOCIATION, and more detailed information may be found in Lamy's papers published in the *Comptes rendus* of the institute of France, vol. lxi., p. 347, and vol. lxx., p. 398.

6. In measuring high temperatures by the heating of water with heated platinum or other metal, according to Pouillet's method, we heat to the temperature to be measured a mass of the metal and then suddenly immerse it in a mass of water. Knowing the weight of the metal and its specific heat, and the weight of the water and its temperature before and after the immersion of the metal, we can compute the temperature of the latter before its immersion as follows: Let m be the weight of the metal, c its specific heat, and t its high temperature before immersion in the water. Let m' be the weight of the water, and t' its temperature before the introduction of the hot metal. The specific heat of water is unity.

The thin metallic vessel containing the water has a weight a , and its specific heat is b . The thermometer which shows the amount of elevation of temperature of the water by the heated metal has a portion of its length heated; let us call the weight of this part of the thermometer e , and its specific heat d . Finally let θ be the temperature of water, metal, vessel, and thermometer after the immersion of the heated metal, and at the moment they have all reached the same temperature. The metal in falling in temperature from t to θ has lost $t - \theta$ degrees, and a quantity of heat equal to $mc(t - \theta)$. The water in being heated from t' to θ has gained in temperature $\theta - t'$ degrees, and a quantity of heat equal to $m'(\theta - t')$. For a similar reason the vessel and the thermometer which partake of the heating of the water gain respectively $ab(\theta - t')$ and $ed(\theta - t')$. Hence the whole quantity of heat gained is $(m' + ab + ed)(\theta - t')$, or $m_i(\theta - t')$ if we make $m_i = m' + ab + ed$; m_i is then called the equivalent mass of water. In forming an equation between the quantity of heat received and the quantity of heat lost we have $mc(t - \theta) = m_i(\theta - t')$; whence t , the temperature of the heated metal, is expressed by

$t = \frac{m_i(\theta - t')}{mc} + \theta$. In using this method Pouillet

heated a ball of platinum in a crucible of the same metal, and the vessel containing the water had a wire cup in its centre into which the heated platinum mass was thrown. One of the elements of accuracy in this method is the precise knowledge of the specific heat of platinum at high temperatures. Pouillet made this a special study, and determined it up to $1,200^\circ$ C., using an air thermometer in obtaining the successive temperatures. To obtain

precise results with this method requires careful attention to several operations in the process, such as allowance for loss of heat by radiation from the water vessel during the experiment, and loss of weight of water by evaporation after weighing it and after the immersion of the heated platinum. We have also to guard specially against the projection of water from the apparatus by the generation of steam by the hot platinum. 7. Becquerel's pyrometer, based on the strength of thermo-electric currents produced by heating the junction of two different metals, is an improvement on a similar one devised by Pouillet. Two wires, one of platinum and the other of palladium, each about two metres long and of one square millimetre of section, are firmly tied together with fine platinum wire for a distance of about a centimetre from their ends. The palladium wire is enclosed in a porcelain tube, while the platinum wire is on the outside of this tube, which is itself enclosed in another tube of porcelain. The free ends of the palladium and platinum wires are soldered to copper wires which lead to a tangent galvanometer, and the junction of the copper and the palladium and platinum wires are immersed in melting ice to keep them at a constant temperature, so that no thermo-electric current can be generated in the apparatus except at the junction of the wires in the porcelain tube. In order to obtain the value of a high temperature, the end of the porcelain tube containing the junction of the wires is heated up to this temperature, and from the deflection of the galvanometer needle produced by the thermo-electric current thus produced we deduce the temperature of the junction of the wires. This apparatus, to be of any value, has to be graduated by exposing the junction of the metals along with an air thermometer to the same successive high temperatures, and thus fixing the relation connecting the indications of each apparatus with the corresponding temperatures. 8. Siemens's pyrometer is thus described by the inventor: "In order to realize a pyrometer by electrical resistance, it is necessary to rely upon the absolute measurement of the electrical resistance of a coil of wire, which must be made to resist intense heats without deteriorating through fusion or oxidation. Platinum is the only suitable metal for such an application, but even platinum wire deteriorates if exposed to the direct action of the flame of a furnace, and requires an external protection. The platinum wire used has, moreover, to be insulated and supported by a material which is not fused or rendered conductive at intense heats, and the disturbing influence of the varying resistance of the wires leading to the platinum wire has also to be neutralized. These various conditions are very fully realized by the arrangement represented in fig. 4. Thin platinum wire is coiled upon a cylinder of hard-baked porcelain, upon the surface of which a double-threaded helical groove is formed for its reception, so as to

prevent contact between the coils of wire. The porcelain cylinder is pierced twice longitudinally for the passage of two thick platinum leading wires, which are connected to the thin spiral wire at the end. In the upper portion of the porcelain cylinder the two spiral wires are formed into a longitudinal loop, and are connected crossways by means of a platinum binding screw, which admits of being moved up or down for the purpose of adjustment of the electrical resistance at the zero of the centigrade scale. The porcelain cylinder is provided with projecting rims, which separate the spiral wire from the surrounding protecting tube of platinum, which is joined to a longer tube of wrought iron, serving the purpose of a handle for moving the instrument. If the temperature to be measured do not exceed a moderate white heat, or say $1,300^{\circ}\text{C.} = 2,372^{\circ}\text{F.}$, it suffices to make the lower protecting tube also of wrought iron to save expense. This lower portion only, up to the conical enlargement or boss of iron, is exposed to the heat to be measured. Three leading wires of insulated copper united into a light cable connect the pyrometer with the measuring instrument, which may be at a distance of some hundred yards from the same. They are connected by means of binding screws at the end of the tube to three thick platinum wires passing down the tube to the spiral of thin platinum wire. Here two of the leading wires are united, whereas the third traverses the spiral, and joins itself likewise to one of the two former, which forms the return wire for two electric circuits, the one comprising the spiral of thin wire, and the other returning immediately in front of the same, but traversing in its stead a comparison coil of constant resistance. By this arrangement of wires the effect of the varying resistances of the leading wires is completely neutralized, for both battery circuits comprise the leading wires up to the distant coil, and all variations of resistance by temperature to which the leading wires may be subjected affect both sides of the balance equally. The measuring instrument may consist of a differential galvanometer if to the constant resistance a variable resistance be added. If the pyrometer coil were to be put

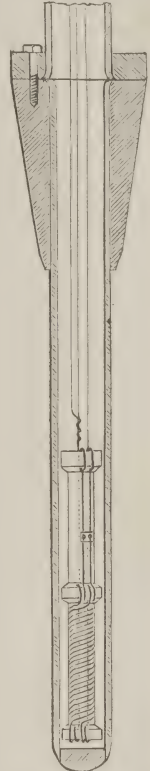


FIG. 4.—Siemens's Pyrometer, Coil Tube.

into a vessel containing snow and water, the balance of resistance between the two battery circuits would be obtained without adding variable resistance to the coil of constant resistance, and the needle of the differential galvanometer would remain at zero when the current is established. But on exposing the pyrometer to an elevated temperature, the resistance of its platinum coil would be increased, and resistance to the same amount would have to be added to the constant resistance of the measuring instrument, in order to reestablish the electrical balance. This additional resistance would be the measure of the increase of temperature, if only the ratio in which platinum wire increases in electrical resistance with temperature is once for all established. This is a question which I shall revert to after having completed the description of the pyrometric instrument. Although I have stated that by means of a differential galvanometer and a variable resistance (constituting in effect a Wheatstone bridge arrangement) the increasing resistance of the platinum spiral may be measured, it was found that the use of a delicate galvanometer is attended with considerable practical difficulty in iron works and other rough places where it is important to measure elevated temperatures, or on board ship for measuring deep-sea temperatures. I was therefore induced to seek the same result by the conception of an instrument which is independent in its action from tremulous motion, or from magnetic disturbance caused by moving masses of iron, and which require no careful adjustment or special skill on the part of the operator. This instrument is represented in fig. 5, and may be termed a chemical resistance measurer or 'differential voltmeter.' Faraday has proved that the decomposition of water in a voltmeter, expressed by the volume of gases V , is proportionate in the unit of time to the intensity I of the decomposing current, or that $I = \frac{V}{T}$. According to Ohm's general

law, the intensity I is governed by the electromotive force E , and inversely by the resistance R , or it is $I = \frac{E}{R}$. It is therefore $\frac{V}{T} = \frac{E}{R}$, or

$V = \frac{ET}{R}$; or the volume V would give a correct measure of the electrical resistance R , if only the electromotive force E and time T were known and constant quantities. But the electromotive force of a battery is very variable; it is influenced by polarization of the electrodes, by temperature, and by the strength and purity of the acid employed. The volume of gases obtained is influenced, moreover, by the atmospheric pressure, and it is extremely difficult to make time observations correctly. It occurred to me, however, that these uncertain elements might be entirely eliminated in combining two similar voltmeters in such a manner that the current of the same battery was divided between the two, the one branch

comprising the unknown resistance to be measured, and the other a known and constant resistance. The volume of gas V , produced in this second voltmeter, having a resistance R , in circuit, would be expressed by $V_1 = \frac{ET}{R_1}$, and we should have the proportion of $V : V_1 = \frac{ET}{R} : \frac{ET}{R_1}$; but E and T , being the same in both cases, may be struck out, and the expression will assume the simple form $V : V_1 :: R : R_1$. The constant resistance R of the one circuit being known, it follows that the unknown resistance R_1 is expressed by $\frac{R_1 V_1}{V}$; that is to say, by a constant multiplied by the proportion of gas produced in the two voltmeters irrespective of time, or strength of battery, or temperature, or the state of the barometer. The resistances R and R_1 are composed each of two resistances, namely, that of the principal coils, which we may term R or R_1 , and of the voltmeter and leading wires, which is the same in both cases, and may be expressed by y . The expression should therefore be written as follows: $V : V_1 = R + y : R + y$, R being the unknown quantity. The mechanical arrangement of the instrument will be understood from the diagram, fig. 5; and the

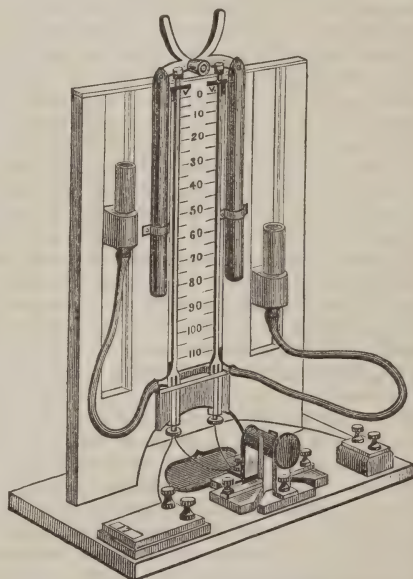


FIG. 5.—Siemens's Pyrometer, Resistance Measurer.

whole arrangement of the pyrometer, with its leading wire and resistance measurer, from the general view given in fig. 6. The voltaic resistance measurer, fig. 5, consists of two calibrated vertical tubes of glass of about three millimetres diameter, which are fixed upon a scale showing arbitrary but equal divisions. The upper ends of the tubes are closed by small cushions of India rubber pressed down upon

the openings by means of weighted levers, whereas the lower portions of the tubes are widened out and closed by plugs of wood, through which the electrodes in the form of pointed platinum wires penetrate to the depth of about 25 millimetres into the widened portions of the tubes. By a side branch the widened portion of each vertical tube communicates by means of an India-rubber con-

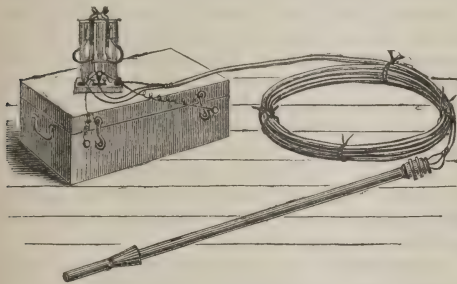


FIG. 6.—Siemens's Pyrometer, General View.

necting pipe to a little glass reservoir containing acidulated water, and supported in a vertical slide. In raising the weighted cushions closing the upper ends of the vertical tubes, and in adjusting the position of the small reservoirs, the acidulated water will rise in both tubes to the zero line of the scale. In turning a button in front of the tubes the battery current is passed through both pairs of electrodes, the one circuit comprising the permanent resistance R and the leading wires up to the pyrometer, and the other the leading wires and the pyrometer coil. If the resistance of the pyrometer coil should be equal to the permanent resistance R , then $R+y$ will be equal to $R+y$, and therefore $V=V_1$; but as the resistances differ, so will the volumes. Necessary conditions are, that both reservoirs are filled with the same standard solution of pure water with about 10 per cent. of sulphuric acid, that all of the electrodes are of the same form and size, and that their polarity is reversed frequently during the progress of each observation, in order to avoid unequal polarization. With these precautions, which involve no particular skill or knowledge of electrical observation on the part of the operator, very accurate results are obtained; but in order not to incur considerable error of observation, it is advisable not to continue the current, reversing the same, say twice, until at least 40 divisions of gases are produced in the least activated tube, which operation will occupy from two to three minutes, if a battery of from four to six Daniell elements is employed. The volumes V and V_1 being noted, after having allowed half a minute for the gases to collect after the current has ceased, the weighted cushions upon the tubes are raised in order to allow the gases to escape, when the water levels will immediately return to their zero position, to make ready for another observa-

tion. By inserting the observed values for V and V_1 into the expression above given, the unknown resistance R , can be easily calculated; but in order to facilitate the use of the instrument, I have prepared a table which gives at a glance the resistance due to any two observed volumes, the volumes V governing the vertical, V_1 the horizontal columns, and the resistance read off at the point of intersection. At each point of intersection the resistance is marked in black, and the corresponding temperature in red ink. It now remains only to be shown what is the relation between the resistance and temperature in heating a platinum wire. The researches of Dr. Matthiesen, who has made the latest investigation on the effect of temperature upon electrical resistance, are restricted to the narrow range of temperatures between 0° and 100° C., nor do they comprise platinum. He adopted the following general

expression for the pure metals: $R_t = \frac{R_0}{1 + \alpha t + \gamma t^2}$,

which, in determining the specific values of α and γ for each metal, gives a close agreement with observation between the narrow limits indicated, but is wholly inapplicable for temperatures exceeding 200° C., when the value t^2 commences to predominate and to produce absurd values for R_t . It was necessary for my purpose to undertake a series of elaborate experiments with a view of finding a ratio of general application. Coils of thin wire, of platinum, iron, copper, and some other metals, were gradually heated and cooled in metallic chambers containing the bulbs of mercury thermometers, and for higher temperatures of air thermometers, and the electrical resistances were carefully noted. The progressive increase of electrical resistance was thus compared directly with the increasing volume of a permanent gas (carefully dried) between the limits of zero and 470° C., and a ratio established which is represented by the formula $R_t = aT^2 + \beta T + \gamma$, in which T signifies total temperature counting from the absolute zero (272° C.), and a , β , and γ specific coefficients for each metal. According to this formula, the electrical resistance is a constant at the absolute zero, and progresses in a ratio represented graphically by a tipped-up parabola, approaching more and more toward a uniform ratio at elevated temperatures. Although the comparison with the air thermometer could only be carried up to 470° C., the general correctness of the ratio of increase just stated has been verified by indirect means in measuring progressive heats, and by comparison with the platinum ball pyrometer. It is important to mention here that great care must be exercised in the selection of the platinum wire for the measuring spiral, one of two samples, both of which were supplied by the same eminent makers, Messrs. Johnson and Mathey, having conducted 8.2 and the other only 4.7 times better than mercury at 0° C. The abnormal electrical resistance of some platinum wire is due

chiefly to the admixture of iridium or other metals of the same group, and it appears that the platinum prepared by the old welding process is purer and therefore better suited for electrical purposes than the metal consolidated by fusion in a Deville furnace. This pyrometer has already received several useful applications. Through its first application an important telegraph cable was saved from destruction through spontaneous generation of heat. Prof. Bolzani of Kazan has made some interesting applications of it for recording the temperature at elevated points and at points below the earth's surface. Mr. Lowthian Bell has used it in his well known researches on blast-furnace economy; and at several iron works pyrometer tubes are introduced into the heating stoves, and permanently connected with the office, where the heat of each stove can at all times be read off and recorded." Experience has shown that of all pyrometers, this is the best adapted for use in the arts. 9. By Mayer's pyrometer the expansion of the wave length of a definite sound, caused by elevation of temperature, is measured as follows: Opposite the mouth of an organ pipe is placed a Helmholtz resonator (see SOUND), which responds to the note of the organ pipe. The sonorous pulses, emanating from the organ pipe, enter the mouth of the resonator, and are thence sent through a tube terminated by a spiral tube of platinum. The pulses which have passed through this spiral tube are led to one of König's vibrating manometric flames. Another flame placed directly behind the former one is vibrated by pulses which have proceeded directly from the organ pipe. If the temperature in the organ pipe and in the spiral tube is the same (as is the case before the latter is introduced into the furnace), on viewing the flames in a rotating mirror we shall see both flames vibrating together and presenting the appearance of a deeply serrated band of light. Now, on slowly introducing the spiral tube into the furnace, we shall see the serrations, produced by the pulses which have traversed this tube, slowly sliding over the fixed serrations which are caused by the pulses led directly from the organ pipe to its special flame. After the air in the spiral tube has reached the temperature of the furnace and is stationary, we shall observe the serrations stationary also. From this observation of the number of movable serrations which have glided over any one fixed serration we can deduce the temperature of the furnace, as follows: Let t = temperature centigrade of the air in and around the organ pipe; t' = that of the air in the spiral or furnace tube; v = velocity of sound at temperature t ; v' = that of sound at temperature t' ; l = number of wave lengths in furnace tube at temperature t ; d = observed displacement of resonator serrations by an elevation of temperature $t'-t$. Then t' , the temperature of the furnace, will be $t' = \left(\frac{vt}{20 \cdot 16 (l-d)} \right)^2 - 272 \cdot 48$,

which gives t' in terms of v , l , and d . For fuller details concerning this method see the "American Journal of Science" for December, 1872. The advantage of this process is that no correction has to be made for barometric pressure, and the precision of the method depends alone on the accuracy of the determination of the coefficient .00367, which is the number arrived at by Regnault and Magnus for the expansion of air under a constant pressure; and this is one of the most certain constants we have in physics. Hence, theoretically, this method is as accurate as that of the air thermometer.—For further information on this important subject of pyrometry, see an article entitled *Pyrometrische Versuche*, by A. Weinhold, in Poggendorff's *Annalen*, vol. xxix., 1873. In this the author gives the bibliography of the subject and details of his experiments with all pyrometers to decide their relative values in practice.

PYROPHONE (Gr. *πῦρ*, and *φωνή*, sound), or **Flame Organ**, a musical instrument invented by Frédéric Kastner of Paris, in which the tones are produced by flames of hydrogen or illuminating gas burning in tubes of different sizes and lengths, arranged similarly to those in the common pneumatic organ. The production of musical tones by means of the little apparatus called the philosopher's lamp, in which hydrogen gas is burned in a tube, is a popular and familiar experiment; but it has been hitherto difficult to produce the same effects with illuminating gas in consequence of the carbon element interfering with the explosions of the gases. Kastner has overcome this difficulty by burning the gas in several small jets arranged in a circle, instead of a large one. He also made the discovery that when these flames were brought together the sound ceased, reappearing as soon as they were separated, and that the position of the flames should be one third the distance from the base of the tube. By a mechanical contrivance keys like those of a pianoforte or organ are connected with jointed arms, at the end of which the flames are burned in such a manner that they may be spread apart or joined together at will by a touch of the finger. The principles involved will be treated in the article SOUND. (See also FLAME.)

PYROPHORUS (Gr. *πῦρ*, fire, and *φέρειν*, to bear), a substance which takes fire on exposure to the air. This property is possessed by several substances and mixtures specially prepared. Finely divided metals, as iron when reduced from the oxide at the lowest possible temperature by a current of hydrogen, exhibit it in a remarkable degree. The effect appears to be produced in all cases by rapid combination of the oxidizable substance with the oxygen of the air. An excellent pyrophorus is produced by calcining in a close crucible 6 parts of lampblack mixed with 11 of sulphate of potash; the product is a mixture of carbon and sulphuret of potassium. Homberg's pyro-

phorus is made by stirring a mixture of equal parts of alum and brown sugar in an iron ladle over the fire till it becomes dry; then heating the same in a red-hot vessel nearly closed as long as a flame appears at the aperture. It is then removed from the fire, and carefully stopped until required for the experiment. Tartrate of lead heated to dull redness in a glass tube becomes a brown powder, which when shaken out into the air ignites. It is prepared from the solution of acetate or nitrate of lead by adding to it tartaric acid or a tartrate.

PYROTECHNY (Gr. *πῦρ*, fire, and *τέχνη*, art), the art of making fireworks for public exhibitions or for military purposes. Until the invention of gunpowder, and before the properties of saltpetre were understood, fireworks may be said to have been unknown in Europe; but the Chinese from an early period were skilful in true pyrotechnic works. In Europe the art was first cultivated by the Italians; and it was described by Biringucci Vanuccio in his work *De la pirotechnia* (1540). In France the subject was treated by J. Hanzelet in his *Traité des militaires* (1598), who recommended the use of the rocket in war, thus anticipating Congreve. The Chinese had from an unknown period employed the rocket as an offensive weapon, affixing to it a pointed barb like that of an arrow. Among the earliest pyrotechnic displays of much note in Europe were the exhibitions at Fontainebleau by Sully in 1606, and by Morel, commissary of artillery, in 1612. The rejoicings at the establishment of peace in 1739 gave occasion for splendid exhibitions at the hôtel de ville and the Pont Neuf in Paris and at Versailles.—The compositions prepared for fireworks are too numerous to be even named in this article, and reference can be made merely to the materials commonly employed, with exemplifications of the manner in which they are compounded in a few of the principal pieces. Gunpowder and its ingredients, nitre, sulphur, and charcoal, are the chief constituents of fireworks. Iron and steel filings and cast-iron borings, which must be free from rust, are used to increase the vividness of the combustion, and produce what is known as the Chinese “brilliant fire.” It is these which are thrown out by rockets as they explode, and produce the bright sparks as they meet the oxygen of the air. Copper filings and the salts of copper give a greenish tint to the fire; zinc filings, a fine blue; sulphuret of antimony, a light greenish blue with much smoke; amber, rosin, and common salt protected against dampness, are used to give a yellow fire; a red is produced by lampblack, and a pink by nitre in excess; the salts of strontia also give a red color, and those of barytes a green.—The most useful piece of fireworks is the sky rocket, employed as a signal, and under favorable circumstances visible for 30 leagues. As a warlike missile it will be treated under **ROCKET**. In exhibitions of fireworks the rocket is a luminous projectile, made

to dart upward with immense velocity and a loud hissing sound, and explode at the top of its flight. It is sent up singly or in volleys of great numbers together, and as they explode each one commonly discharges colored lights which descend in brilliant showers, or dart forth in every direction with the irregular motions of the so-called fuses and serpents. It is made of various compositions, which are packed in tubes formed by rolling paper hard round a cylindrical core. The match by which the rocket is to be fired is introduced into the cavity at the bottom, and the whole exposed surface of the composition forming the walls of the cavity is instantly ignited. The gaseous products, being violently ejected from the open end, react with equal force, carrying the rocket forward in the other direction. The movement would be extremely wild if not controlled by some regulator. This is furnished in a long balance stick firmly tied to the rocket and projecting several feet behind. It is made of light wood, and when it is set free after the explosion it rarely falls with sufficient velocity to do any harm. Long triangular pieces of pasteboard have been secured by the edge to the sides of the rocket as a substitute for the stick, and have also served to steady its movement. Among the decorations or garnitures for the rockets are stars, small cylindrical or cubical bodies variously compounded, as of 1 part of sulphuret of antimony, 2 of quartz, 2 of gunpowder, 15 of nitre, 6 of sulphur, and 2 of zinc filings. The materials, being separately pulverized, are mixed into a stiff paste with gum water or glue, made into the desired shapes, rolled in gunpowder, and dried.—Roman candles are cylindrical cases charged with stars alternating with a composition like that of the rockets, and with gunpowder. A small quantity of the composition is rammed into the bottom of the case, upon this a little gunpowder, and a star is then pushed down upon the powder. These charges are repeated in the same order until the case is filled. The end is then closed with a piece of match paper pasted round the outside and drawn to a point at the top. When this is fired the charges are shot at short intervals successively from the tube into the air. The effect is heightened by varying the composition and colors of the stars. A red fire adapted for this or other pieces may be made by mixing 4 parts of dry nitrate of strontia with 15 of pulverized gunpowder; or this may be varied with 40 parts of the strontia, 13 of sulphur, 5 of chlorate of potash, and 4 of sulphuret of antimony. The usual precautions should be observed in pulverizing and mixing the chlorate of potash. A green fire like that burned in theatres, which gives to everything upon the stage a death-like aspect, is produced by 77 parts of nitrate of barytes, 13 of sulphur, 5 of chlorate of potash, 3 of pulverized charcoal, and 2 of arsenic.—Bengal lights, also called blue lights, and used by ships as night signals,

are compounded of nitre 7 or 5 parts, sulphur 2, antimony 1; or for the sparkling ones, 4 each of sulphur and nitre, 1 of antimony, and 2 of fulminating composition (of fulminating mercury and gunpowder). The proportions of these ingredients may be variously modified from those given.—The published works on pyrotechny are mostly of the 17th and 18th centuries. Those of more recent date are: *L'art de faire à peu de frais les feux d'artifice* (Paris, 1828); *Manuel de l'artificier*, by A. D. Vergnaud (Paris, 1828); and "Pyrotechny," by G. W. Mortimer (London, 1853). The fullest work in English is "System of Pyrotechny, comprehending the Theory and Practice, with the Application of Chemistry," by James Cutbush (large 8vo, Philadelphia, 1825).

PYROXENE (Gr. *πῦρ*, fire, and *ξένος*, a stranger), a mineral species of Dana's augite section of the silicates, comprising numerous varieties. That to which the name was first applied, though found in the so-called igneous rocks, was supposed not to occur in modern lavas; whence the name. The species is interesting for its many varieties, which differ in physical characters and chemical constituents, and consequently have been separated by different mineralogists among several species. They were first brought together under the head of pyroxene by Haüy, who recognized the identity of the crystalline form common to them all; and though for a time the relationship among them was not admitted by chemists, it was at last found that the differences in their composition resulted from the substitution of one isomorphous element for another, and that one general formula might be used to express the combination of silicic acid with one or more of the following bases (one replaced by another in any proportions), viz.: lime, magnesia, protoxide of iron, or manganese, and sometimes soda. Alumina may also enter into the composition, replacing it may be a portion of silicic acid, without essentially changing the crystallization. Among the varieties comprised in this species are the augites, coccolite, diopside, sahlite, jeffersonite, and many others.

PYROXYLIC SPIRIT (also known as pyroligneous spirit or ether, wood spirit or naphtha, methylic alcohol, hydrate of methyle, &c.), a spirituous liquid, not a product of fermentation, but forming one of the most volatile constituents of pyroligneous acid, from which it is obtained in the process of purifying this acid by distillation; formula CH_4O . (See **ACETIC ACID**, and **NAPHTHA**.) When purified, wood spirit is a colorless liquid of a penetrating empyreumatic odor, and a disagreeable burning taste. It is very inflammable, burning like alcohol with a blue flame. It mixes with water, alcohol, and ether in all proportions. It boils at 150° , and at 68° its specific gravity is 0.798; at 32° , 0.8179. The substance was first recognized by P. Taylor in 1813; but its properties were first explained by Dumas and Peligot in 1835. In Great Britain wood naphtha, not

being subject to the excise duty, has been a valuable substitute for alcohol in various manufactures. By repeated rectifications over lime or chalk, and rejecting the latter portions in the distillations, it was obtained of strength varying from 80 to 90 per cent. of pure spirit, and of specific gravity from 0.87 to 0.83. From its property of dissolving the resins it was much used in the production of varnishes, lacquers, &c., and by the hatters for their solutions of shellac. The medical properties of wood naphtha have not been fully investigated, but it has been regarded as narcotic, sedative, and anti-emetic. At present it is little used, if at all. Berthelot has prepared wood spirit artificially by acting upon marsh gas with chlorine, and decomposing the chloride thus obtained by means of a solution of potash.

PYROXYLINE. See **EXPLOSIVES**, vol. vii., p. 35.

PYRRHA. See **DEUCALION**.

PYRRHO, a Greek philosopher, a native of Elis, born about 360 B. C., died about 270. He was successively a painter, a poet, and a companion of Anaxarchus, under whose patronage he joined the eastern expedition of Alexander the Great. He addressed a poem to that monarch, for which he received 10,000 pieces of gold. After the Indian campaign he returned to Elis, where he was made high priest, and for his sake a law was passed exempting philosophers from the payment of taxes. The only condition which he deemed worthy of a philosopher was that of suspended judgment. A man, he taught, should be indifferent to all external circumstances of life, and allow nothing to disturb his equanimity. Virtuous imperturbability was the highest aim of life, but truth, from a scientific point of view, unattainable. He developed his views only orally, and his name was bestowed on all who shared them. The Pyrrhonists were called inquirers, skeptics, ephectics, and doubters. His doctrines were expounded by Timon, Philo of Athens, Nausiphanes of Teos, and many others.

PYRRHUS, son of Achilles. See **NEOPTOLEMUS**.

PYRRHUS, king of Epirus, born about 318 B. C., killed at Argos in 272. He was the son of Æacides and Phthia, and traced his descent from Pyrrhus, the son of Achilles, and was also connected with the royal family of Macedon. His father having been dethroned by the Epirotes, Pyrrhus was rescued and brought to Glaucias, king of the Taulantians, an Illyrian people, who educated him with his own children. When Cassander's power in Greece was weakened, his protector restored Pyrrhus to his throne; but he was again expelled by the Epirotes, and fled to his brother-in-law Demetrius Poliorcetes, who was then in Asia. He distinguished himself at the battle of Ipsus in 301, and subsequently went into Egypt as a hostage for Demetrius. There he gained the good will of Ptolemy's wife Berenice, married

her daughter Antigone, and was furnished by the king with a fleet and troops to recover Epirus. He found Neoptolemus in possession of the throne, and the two agreed to hold it in common; but presently, to prevent his own destruction, Pyrrhus put Neoptolemus to death (about 295). He now interfered in the quarrels of Antipater and Alexander, the two sons of Cassander, and took the part of the latter on condition that he should receive Acarnania, Amphilochia, Ambracia, and some Macedonian districts. He then placed Alexander on the throne of Macedon, but the latter was soon dethroned by a powerful neighbor. Pyrrhus came and restored him to his kingdom. Soon afterward Demetrius, to whom Alexander had also applied for aid, put him to death and made himself king in his place. Hostilities soon arose between Pyrrhus and Demetrius, who had formerly been close friends. In 291 Thebes revolted from Demetrius; and while the Macedonian king was engaged in the siege of that place Pyrrhus marched into Thessaly, but was forced to retire. Thebes fell in 290, and Demetrius invaded Epirus in 289, leaving Pantauchus in Ætolia with a large force. Pyrrhus, advancing to meet Demetrius, but taking a different route, entered Ætolia, encountered Pantauchus, vanquished him in single combat, and routed his army. The next year he invaded Macedonia, and marched as far as Edessa, but was driven back, and soon after concluded a peace with Demetrius, who was now anxious to regain his father's dominions in Asia. Hereupon Seleucus, Ptolemy, and Lysimachus entered into an alliance, which they persuaded Pyrrhus to join, to attack the Macedonian king in his European dominions. Demetrius fled, and his kingdom was divided, a large share of Macedonia falling to Pyrrhus; but the Macedonians soon drove him out again, and put themselves under Lysimachus. In 281 an embassy from the Tarentines implored Pyrrhus to come over to Italy and assist the Greek inhabitants against the Romans. He set out in 280 with an army of 20,000 foot, 3,000 horse, 2,000 archers, 500 slingers, and a number of elephants; but a great storm scattered the fleet, and Pyrrhus arrived at Tarentum with only a small part of his army. There, while waiting for the dispersed ships to come in, finding the inhabitants indisposed to take their proper share in the war, he compelled them to enter the army, closed their theatres, and soon showed himself their master as well as ally. Failing to negotiate with M. Valerius Lævinus, the Roman general, Pyrrhus met him on the river Siris (now Sinno), and won a victory with the loss of a large number of his best troops. "Another such victory," he is reported to have said, "and I must return to Epirus alone." He now sent Cineas to Rome, offering peace on condition that the independence of the Italian Greeks should be recognized, and that the Samnites, Lucanians, Apulians, and Bruttians should regain the pos-

sessions they had lost in the war. The Roman senate rejected the terms, and Pyrrhus marched to within 24 miles of Rome, plundering the country as he went; but the arrival of the Roman army from Etruria compelled him to retire. He took the field again in the spring of 279, and gained a hardly won victory at Asculum. Few of his Grecian troops were now left; and, unable to obtain reinforcements from home, he was willing to conclude a truce in order to drive the Carthaginians from Sicily. Previously the Roman consuls Fabricius and Æmilius had sent back to Pyrrhus a servant who had deserted and promised to poison his master, and in return for this Pyrrhus released all the Roman prisoners. He now passed over into Sicily, and at first was so successful that the Carthaginians agreed to assist him against the Romans on condition of peace. He rejected this offer, but failing in an attack upon Lilybæum returned to Italy in 276. His fleet was attacked by the Carthaginians, and 70 of his ships were destroyed. In 275 he was routed near Beneventum by Curius Dentatus, and obliged to return to Epirus. In 273 he invaded Macedonia, of which Antigonus Gonatas, the son of Demetrius, was then king, and for the second time gained possession of that country. At the instance of Cleonymus, who had been excluded from the Spartan throne, he marched into Laconia in 272 with 25,000 foot, 2,000 horse, and 24 elephants. He arrived before Sparta at the close of day, but deferred the attack until the following morning. During the night the Spartans fortified themselves so strongly as to be able to hold the city until relieved by reinforcements. Taking up his winter quarters in Laconia, Pyrrhus was induced to interfere in the affairs of Argos, and in a conflict in the streets of that city he received a slight wound from a javelin. He was about to cut down the Argive who had attacked him, when the mother of the man hurled from the roof of a house a large tile which struck Pyrrhus on the back of the neck. He fell from his horse and was killed by soldiers of the enemy. Pyrrhus was regarded in subsequent times as one of the greatest generals that had ever lived. He wrote a work on the art of war, and his commentaries are quoted by Dionysius and Plutarch.

PYTHAGORAS, a Greek philosopher, founder of a philosophical, religious, and political association in southern Italy, born in Samos about 580 B. C., died probably in Metapontum about 500. He was the son of Mnesarchus, an opulent merchant, and according to some accounts was a disciple of Pherecydes of Syros, and of Thales and Anaximander. He is said to have spent 30 years in travel for the purpose of collecting all attainable knowledge, especially the esoteric doctrines of priests concerning the worship of the gods. Egypt, Arabia, Phœnicia, Judea, Babylonia, and even Gaul and India, are among the countries in which he is said

to have travelled. Herodotus traces the doctrine of metempsychosis and certain religious regulations of the Pythagoreans and Orphists back to the Egyptians, thus apparently implying that Pythagoras visited Egypt. Aristotle testifies that the mathematical sciences originated in Egypt, and were there cultivated by the priests; and according to Callimachus Pythagoras brought his mathematical knowledge from that country. On the authority of Apollodorus, Diogenes Laërtius ascribes to Pythagoras, among other things, the discovery of the relation between the hypotenuse and the sides of the right-angled triangle. It is easy to see that many of the statements made by later writers are mere embellishments and fables. Following Aristoxenus, Diogenes Laërtius again says that Pythagoras emigrated to Crotona in lower Italy, in order to escape the tyranny of Polykrates, and according to Cicero he came to Italy about 529 B. C. In Crotona he succeeded in winning the aristocratic party to his project of an ethical and religious reform, and in uniting them into a powerful political faction. Then it is said that about 20 years later the democratic party of Crotonians, under Cylon, obtained his banishment, and he withdrew to Metapontum, where he soon died.—It is generally held that Philolaus, a contemporary of Socrates, was the first to publish the Pythagorean system of philosophy; but though a considerable number of fragments that pass under his name are extant, their authenticity is very questionable. Böckh's collection of the fragments has been in part, if not wholly, rejected by Zeller, Rose, and others. The writings reported to come from Pythagoras himself are undoubtedly spurious. The most important indications of his doctrines are obtained from the writings of Aristotle. The fundamental doctrines are, that the essences of all things rest upon numerical relations; that numbers are the principle of all that exists; and that the world subsists by the rhythmical order of its elements. Everywhere in nature appear the two elements of the finite and the infinite, which give rise to the elementary opposites of the universe, the odd and even, one and many, right and left, male and female, fixed and moved, straight and curved, light and darkness, square and oblong, good and bad. The essence of number is unity, which is at once odd and even, and contains in itself in germ all the universe. It is both the form and the substance of all things, and identical with the Deity. Proceeding from itself it begets duality, and returning upon itself it begets trinity. Added to itself it produces the line; a third point placed on the other two gives the surface; and a fourth point placed on the other three gives the pyramid or solid. The quadrate or tetractys and the decade are, like unity, sacred numbers and first principles. The universe was produced by the breathing of the first principle into the infinite void of the world, which thus became

both finite and infinite, and therefore capable of development into a multiplicity of numbers or things. In the actual world every single whole is a unit, capable of further development by the vital process of breathing. Every abstract idea is a number, and material objects are symbols of numbers. Thus the Pythagoreans called justice a square number, intending by this to express the correspondence between action and suffering or retribution. There are five elements, earth, fire, air, water, and ether, represented respectively by the cube, pyramid, octahedron, icosahedron, and dodecahedron. The universe is a harmonious whole, consisting of ten great bodies revolving around a common centre. The doctrine of the harmony of the spheres was based on the idea that the celestial spheres were separated from each other by intervals corresponding with the relative lengths of strings arranged to produce harmonious tones. The centre is the sun, the seat of Jupiter, the principle of life, and the most perfect object in nature. That his hypothesis of the sun's immobility, and of the revolution of the earth around it, agrees with the facts of nature, was shown much later (about 280 B. C.) by the astronomer Aristarchus of Samos. The stars also are divinities, and men and even inferior animals are akin to the Supreme Being. The souls of men are moving numbers, light particles from the universal soul, capable of combining with any body, and destined to pass successively through several. They are chained to the body as a punishment, and dwell in it as in a prison. With the theory of metempsychosis he combined the doctrine of moral retribution. The reason and understanding have their seats in the brain; the passions are placed in the heart. Moral good is identified with unity, evil with multiplicity; virtue is the harmony of the soul and its similitude to God. The aim of life is to make it represent the beautiful order of the universe. The whole practical tendency of Pythagoreanism was ascetic (according to some accounts including abstinence from animal food), and inculcated a strict self-control, promoted, as is said, by a novitiate of silence, and an earnest culture, in which music was considered important. Though it seems to have been founded on the mysticism of numbers, yet Aristotle called the Pythagoreans a school of mathematicians.—See Schaarschmidt, *Die angebliche Schriftstellerei des Philolaus* (Bonn, 1864); Zeller, *Die Pythagorassage* (Leipsic, 1865); and Ueberweg's "History of Philosophy" (translated into English, New York, 1872).

PYRUS. See APPLE, ASH, and PEAR.

PYTHEAS, a Greek navigator of Massilia or Marseilles, who flourished about the age of Alexander the Great. He is said to have made two voyages, in one of which he visited Britain and Thule (perhaps Iceland), and in the second passed along the western and northern coast of Europe. He also wrote two

books, one of which, describing the ocean, was probably an account of his first voyage, and the other, entitled *Periplus*, of his second. Polybius and Strabo treat the statements of Pytheas with contempt; but in modern times it has become evident that he was a bold navigator and sagacious observer. He was the first who determined the latitude of a place from the shadow cast by the sun, obtaining the position of Massilia by the gnomon. He was also aware of the influence of the moon upon the tides. The few fragments of Pytheas now extant were collected by Arvedson (Upsal, 1824).

PYTHIA. See DELPHI.

PYTHIAN GAMES, one of the four great national festivals of Greece, held at Delphi, which was originally called Pytho from the serpent Python killed by Apollo near there. The legendary account attributed the origin of these games to Apollo, although there were traditions referring them to Amphictyon, Diomedes, and other heroes. At first the Delphians themselves decided the disputes and adjudged the prizes, but after the Crissæan war the management came into the hands of the Amphic-

tyons. Once, in Ol. 122, the games were held in Athens by the advice of Demetrius Poliorcetes. They appear to have lasted as long as the Olympic games, or till about A. D. 394. They were held in the Crissæan plain, which had a theatre for the musical contests, a race course, a stadium 1,000 ft. long, and probably a gymnasium, prytaneum, and similar buildings. Some ancient writers tell us that they were first called Pythian games in Ol. 48, when the Amphictyons assumed their management. Previously they had been held at the end of every eight years, but afterward at the end of every four. They were probably solemnized in the spring, and lasted several days. There were other Pythian games of less importance held in various places in Greece, Asia Minor, and Italy, where the worship of Apollo was established.

PYTHIAS. See DAMON AND PYTHIAS.

PYTHON (Daudin), a genus of large tropical, non-venomous serpents, replacing in the old world the boas of the new. The pythons differ from the boas in having four teeth in the intermaxillary bone, and in most of the subcaudal scales being in pairs. (See BOA.)

Q

Q, THE 17th letter and 13th consonant of the English alphabet. It corresponds with the Hebrew and Phœnician *koph*, and as it is seldom used except in conjunction with *u*, most grammarians are disposed to regard it as a superfluous letter whose place could be supplied by *k*. It does not occur in the Greek, old Latin, Slavic, Irish, or Saxon alphabet; but it was introduced into the Latin at a pretty early period. The words which are now written with a *q* were spelt by the ancient Romans with a *c*, as *anticus* for *antiquus*, *cotidie* for *quotidie*; and some words are still spelt indiscriminately with either, as *locutus* or *loquutus*. Varro and some other grammarians never consented to admit this letter into the Roman alphabet. Others regarded it not as a simple letter, but as a contraction of *cv* or *cu*; thus *quis*, according to them, was originally *cvis* or *qis*. The Anglo-Saxons for *qu* wrote *cw*. *Q* never ends a word in English, but it does in French, as *cinq*. It is sometimes used without *u* in the transcription of words from the Arabic and other oriental languages, to represent a peculiar guttural sound. The letters with which it interchanges are *c* and *k*. As a Latin numeral it stands for 500, or with a dash over it (\overline{Q}) for 500,000. Used as an abbreviation, it signifies *quantum*, *quod*, *quæ*, *que* (and), Quintus, &c.

QUA BIRD, or **QNAWK**. See NIGHT HERON.

QUACKENBOS, George Payn, an American educator, born in New York, Sept. 4, 1826. He graduated at Columbia college in 1843, spent a

year in North Carolina, and began to study law in New York. In 1847 he opened a private school in that city, and he continued to teach till 1868. He has been a contributor to various journals, and in 1848-'50 conducted the "Literary American." He has published many popular school books, including text books of rhetoric and natural philosophy, arithmetics, grammars, and elementary histories. He received the degree of LL. D. from Wesleyan university in 1863.

QUADI, a powerful ancient people of S. E. Germany, of the Suevic race. They inhabited the country between Mount Gabreta, the Hercynian forest, the Sarmatian mountains, and the Danube (portions of Bohemia, Moravia, and Lower Austria), their neighbors being the Gothini and Osi on the northeast, the Jazyges Metanastæ on the east, the Pannonians on the south, and the Marcomanni on the northwest. Of the last named they were allies. In the reign of Tiberius the Romans erected a kingdom of the Quadi, and gave the crown to Vannius; but in the reign of Marcus Aurelius the Quadi joined the German confederacy against the empire, and in 174 were on the point of destroying the imperial legions in a great battle when a sudden storm enabled the Romans to recover and gain a victory. The Quadi remained independent till their disappearance from history about the close of the 4th century.

QUADRANT (Lat. *quadrans*, a quarter), the fourth part of the circle or an arc of 90°, and hence an instrument employed for measuring

angles in any plane. The use of quadrants has been for surveying and for making astronomical observations, and especially in navigation for determining the meridian altitude of the sun, and through this the latitude of the observer. They have been constructed of a great variety of forms and dimensions adapted for their several uses; but at present the interest attached to them is historical only, as they have been entirely superseded either by the sextant or the full circle. The former, of more portable form than the quadrant, by the use of two reflecting mirrors doubles the angle included between the direct and reflected line of light, and thus with an arc of 60° or one sixth of the circle includes a range of 120° ; while the circle, on account of the symmetry of its form and the completeness of its graduated arc all around, secures greater exactness in its readings, and is less liable to the introduction of any unsuspected source of error. Ptolemy made use of a quadrant for determining the obliquity of the ecliptic. Tycho Brahe had a large mural quadrant (so called from its being suspended upon an axis secured in a solid wall of masonry) with which he observed altitudes, and also another on a vertical axis for measuring horizontal angles. The mural quadrants of that period were of 6 or 8 ft. radius, and for some time continued to be employed in the principal observatories. Sir Isaac Newton is said to have constructed a reflecting quadrant as early as 1672; but the first instrument of this character brought before the public was that afterward known as Hadley's, the invention of which was claimed by Godfrey, a mechanic of Philadelphia. This instrument, which has been in general use in navigation, is a graduated octant of 90 half degrees, reading as 90° . With the radial bars at each extremity of the arc it forms a triangular frame, which is made of convenient dimensions for holding in the hands. A movable radial bar or index revolves in the plane of the sector upon a pin passing through the centre. At the centre it carries a mirror, the face of which is perpendicular to this plane, and which in making an observation is turned toward the object, as the sun or a star, and at the other end it carries a vernier for subdividing the angles on the graduated limb. On the outer edge of the radial bar, back of the movable mirror, is the sight vane, which is directed across to a second mirror fixed upon the opposite bar, its plane perpendicular to that of the bar, and its face so adjusted that a ray reflected from the first mirror to the second is transmitted from this to the eye at the sight vane. Only half of the glass of the second mirror, called the fore horizon glass, is silvered, and consequently rays passing through it from any object, as the horizon at sea, meet the eye in a direct line; and if at the same instant, while the instrument is held to this position, the index is moved so as to bring the reflected image of the sun upon the silvered part of the glass and from this to

the eye, the reading of the vernier is the elevation of the sun above the horizon. Various other appendages are introduced in the quadrant, as a telescope for the sight vane, colored glasses for diminishing the intensity of the light, and a third mirror called the back horizon glass, with its sight vane, for taking a back observation. (For Gunter's quadrant, see GUNTER.)—In gunnery, the quadrant or gunner's square is a rectangular frame with a graduated arc between the two limbs. One of the limbs is extended beyond the arc, so as to be set into the mouth of the piece, the elevation of which it is to measure. A plummet suspended from the point of meeting of the two arms marks by the intersection of its line on the graduated arc the degree of elevation.

QUADRATURE, the finding of a square equal in area to that of any given figure. No mathematical problem has excited so great interest as the quadrature of the circle, or the determination of a square of the same area. As it is proved that the area of a circle is equal to that of a right-angled triangle, the altitude of which is the radius of the circle and the base its circumference, and as the side of the square of equal surface with the triangle is a mean proportional between the height and half the base of the triangle, the problem would be solved if the circumference could be immediately calculated from the radius which is known. Thus the question of the quadrature of the circle is reduced to finding the proportion between the diameter and circumference. Archimedes undertook the solution of the problem on the principle of calculating the peripheries of two polygons of many sides (as 96), one circumscribed about the circle and the other inscribed, between which must lie the circumference of the circle. He thus found that the ratio of the diameter to the circumference lay between $1 : 3\frac{1}{8}$ and $1 : 3\frac{1}{4}$, and he adopted the former, which is also expressed $7 : 22$. The Hindoos at some early period, certainly before any improvement was made upon this result in Europe, obtained the proportion $1,250 : 3,927$, or 3.1416 , which is much more exact than that of Archimedes. Ptolemy gives 3.141552 , which is not quite so correct. In modern times the first great step in extending this calculation was made by Peter Metius, a Hollander, and was published by his son Adrian Metius. By calculating from polygons of about 1,536 sides he found that the proportion was less than $3\frac{1}{128}$ and greater than $3\frac{1}{160}$; and presuming that the mean of these was nearer the truth than either limit, he happily hit thus by chance on a near approximation, and determined a ratio convenient for practical purposes, and easy to recollect from its terms being made up of successive pairs of the first three odd numbers, viz.: $113 : 355$. The error involved in this expression in a circle of 1,900 miles circumference is less than one foot. Ludolph van Ceulen (or Keulen), another Hollander, in 1590, about the same time that Metius

made his calculations, extended the calculation to 36 figures, which are engraved upon his tombstone in Leyden. These are 3.14159265358979323846264338327950289. The last figure is too large, and 8 would be too small. This was obtained by calculating the chords of successive arcs, each one being half of the preceding; for the above result this was carried out so far, that the last arc was one side of a polygon of 36,893,488,147,419,103,232 sides. The method of calculation was greatly simplified by Snell, who carried the computation to 55 decimal places by means of a polygon of only 5,242,880 sides. By other mathematicians the computation was carried on, reaching successively during the last century 75, 100, 128, and 140 places of decimals; and Montucla received from Baron Zach 154 figures, said to have been obtained from a manuscript in the Radcliffe library at Oxford, of the existence of which there is no other evidence. The figures, however, except the last two, have since been proved correct. (See Montucla, *Histoire des recherches sur la quadrature du cercle*, 1754.) Notwithstanding that Lambert in 1761, and still later Legendre in his *Éléments de géométrie*, proved that the ratio of the diameter to the circumference cannot be expressed by any numbers, the wish to satisfy those who still sought the exact expression of this ratio led other mathematicians to continue to add to these figures; and some must have derived a singular gratification in the computation itself and its never terminating result. In May, 1841, a paper was communicated to the royal society by Dr. Rutherford of Woolwich, presenting 208 figures of decimals, of which however 56 were afterward proved to be wrong, so that the series was not really carried beyond the result obtained from the Oxford manuscript. In 1846 200 decimals were correctly made out by Mr. Dase; and the next year 250 by Dr. Clausen of Dorpat. In 1851 Mr. William Shanks of Durham calculated 315 decimals, which Dr. Rutherford verified and extended to 350. Mr. Shanks soon carried these to 527 decimals, of which 411 were confirmed by Dr. Rutherford. Finally in 1853 Mr. Shanks reached the number of 607 decimals, and gave the result in his "Contributions to Mathematics" (London, 1853).—When it was made evident that the arithmetical expression was impossible, it was still hoped by many that the ratio might be determined by geometrical construction; and the bare possibility of this, which a few mathematicians have admitted, has given encouragement to some to seek the solution in this direction. But this, too, is now generally admitted to be impracticable.—Little benefit has resulted from the vast amount of time and labor that have been expended upon this famous problem. Wallis, investigating it at a time when the nature of the subject was not so well understood, and the investigation was consequently a proper one, was led to the dis-

covery of the binomial theorem; but most of those who have since interested themselves in the question understood too little of the mathematical sciences to avail themselves of any opportunity that might be presented of increasing the means of mathematical research. The academy of sciences at Paris in 1775, and soon after the royal society in London, to discourage this and other similarly futile researches, declined to examine in future any paper pretending to the quadrature of the circle, the trisection of an angle, the duplication of the cube, or the discovery of perpetual motion.

QUADRUNANA (Lat., from *quatuor*, four, and *manus*, hand), a division of the mammalia embracing the lemurs and monkeys or apes, and forming the highest order of Owen's subclass *gyrencephala*, so called from the generally prehensile nature of their four extremities. Although, on anatomical grounds, the term quadrunanous cannot be considered as strictly applicable to the members of this extensive order, it is nevertheless retained by the majority of naturalists in contradistinction to bimanous (two-handed), as restricted to man alone. The restoration of the Linnæan term *primates* (limited so as to exclude the *cheiroptera*) has of late been advocated by Prof. Huxley, as more conformable to the true nature of structural affinities, a view in which he has been sustained by St. George Mivart. This order, which has been conveniently divided into the three families of *strepsirrhini*, *platyrrhini*, and *catarrhini*, may be briefly defined as follows: Animals with a deciduate, discoidal placenta; clavicles complete; orbital ring completely circumscribed, and usually separated by an osseous septum from the temporal fossa; pollex (when present) often, and hallux generally opposable, the latter provided with a flat nail (except in orang, in which the nail is often wanting); cerebral hemispheres well developed and strongly convoluted, covering the cerebellum (except in *mycetes* and certain genera of the *lemuridae*, where the cerebellum is naked, and in the marmoset, where the external gyri and sulci are almost entirely wanting); stomach in most cases simple (complex in *sempithecus* and *colobus*) and furnished with cæcal appendages; teeth never in an unbroken series, but separated by a diastema.—The *strepsirrhini* (lemurs, aye-ayes, loris, galagos, potos, and indris) constitute the lowest family of the order, and inhabit portions of Africa, Madagascar, and some of the Asiatic islands. They are characterized by the twisted nature of their nostrils, and by the presence of a claw on the second digit of the foot. The aye-ayes (*cheiromys*), which seem to connect the lemurs with the lower rodents, form an abnormal group by themselves, by reason of the true rodent type of their dentition, which is, incisors $\frac{1}{1}-\frac{1}{1}$, canines $\frac{0}{0}$, premolars $\frac{1}{1}-\frac{1}{1}$, and molars $\frac{3}{3}-\frac{3}{3}=18$. The chisel-shaped incisors, moreover, agree with those of the rodents in growing from persistent pulps, but differ in being entirely in-

vested with a coat of enamel. The *platyrrhini*, American monkeys, are distinguished from the *catarrhini*, or monkeys of the old world, by several well marked characters, the most prominent of which is the broader development of the nasal septum. They also differ from them in the universal presence of a tail, which is generally prehensile, and in their dental formula, which is, incisors $\frac{2}{1}-\frac{2}{1}$, canines $\frac{1}{1}-\frac{1}{1}$, premolars $\frac{3}{2}-\frac{3}{2}$, and molars $\frac{3}{2}-\frac{3}{2}=36$. The marmosets form a sole exception to the general rule of dentition, in possessing but two molars in each side of both jaws, thereby reducing the total number of teeth to 32. The *catarrhini* have the dental formula corresponding to that of man, namely, incisors $\frac{2}{1}-\frac{2}{1}$, canines $\frac{1}{1}-\frac{1}{1}$, premolars $\frac{2}{1}-\frac{2}{1}$, and molars $\frac{3}{2}-\frac{3}{2}=32$. In this family the *meatus auditorius externus* is osseous, and the pollex is, with one exception (*colobus*), always opposable, circumstances which would be by themselves almost sufficient to separate the monkeys of the old from those of the new world. The *catarrhini* have been divided into the subfamilies *cynomorpha* and *anthropomorpha*. The former (baboons, macaques, &c.), which are essentially quadrupedal, are all possessed of ischial callosities, and in the majority of cases cheek pouches, serving as temporary receptacles for food, are present; the latter comprise the anthropoid apes, which, like the gorilla, assume a semi-erect attitude.—The skull in the quadrumana presents an extraordinary amount of divergence. It rarely assumes the rounded form observed in man, owing to the disproportionate size of the face as compared to that of the brain case. The facial portion attains its greatest development in the dog-faced baboon (*cynocephalus*) of Africa, where the jaws are prodigiously extended. The squirrel monkey (*chrysothrix*) of South America presents the opposite extreme, in having the face relatively smaller even than in man. In no instance does the absolute size of the brain approach that of the human subject. The cranial capacity, which is seldom as much as 26 or 27 cubic inches (orang and chimpanzee), reaches its maximum, 35 inches, in the gorilla. The number of vertebræ entering into the composition of the dorso-lumbar region of the spinal column is 17 in the orang, chimpanzee, and gorilla, 18 in *ateles* and *hylobates*, 22 in *nyctipithecus*, and 19 in the remaining monkeys; in the lemurs the number varies from 19 (typical) to 24 in *stenops tardigradus*. The caudal vertebræ are susceptible of a much greater variation, ranging from 3 in the Barbary ape to 33 in the spider monkey. The muscular system of the quadrumana closely resembles that of man, differing most widely in the long-tailed monkeys, where the muscles answering to the coccygeal in the human form are very greatly developed. The respiratory system presents some curious modifications, especially noticeable in the singular structure of the larynges. These are in many cases provided with air

sacs, numbering five in the howlers, whereby the intensity of sound is greatly increased.—The quadrumana are very extensively distributed over the tropical regions of both hemispheres. The *catarrhini* inhabit almost the entire continent of Africa, a large portion of southern Asia, and most of the islands constituting the Indian archipelago. It is a singular fact that Papua, an island rich in animal and vegetable forms, and presenting climatal and terrestrial conditions almost analogous to those of Borneo, Sumatra, or Java, should be entirely destitute of a monkey population; nor is it less remarkable that Australia has thus far furnished not a single representative of this family. But one species, the *macacus inuus*, is found native of Europe. Brazil is preëminently the home of the American monkeys, which however extend from Mexico to the 30th parallel of S. latitude. The West India islands present the same peculiarity as Papua. The limit of the vertical distribution of the quadrumana appears to be about 11,000 ft.—No unequivocal remains of a monkey have as yet been discovered in any formation dating anterior to the miocene. The best known fossil forms are the *dryopithecus* and *pliopithecus*, from the fresh-water deposits of France. It is worthy of remark that the present divisions of *catarrhini* and *platyrrhini* seem to have been as clearly defined in former ages as they are now, no representative of either family having as yet been found in the hemisphere other than that to which it is peculiar.—The exact position of the quadrumana is still unsatisfactorily determined. Their close relationship to the bimana is obvious, but, as Mivart remarks, it may be doubted whether, if the animal man had never existed, the highest point in the scale of perfection would have been conceded to the apes. The transition to the quadrumana from the lower orders is effected through the *galeopithecus*, a lissencephalous insectivore, inhabiting the Indian archipelago.—For detailed descriptions of the different families, see the articles APE, AYE-AYE, BABOON, CHIMPANZEE, GIBBON, GORILLA, LEMUR, LORI, MACAQUE, MARMOSET, MONKEY, and ORANG-OUTANG. See also Owen, "Anatomy of Vertebrates," vols. i. and ii. (1866-'8); Huxley, "Man's Place in Nature" (1863), and "Anatomy of Vertebrated Animals" (1872); Darwin, "Descent of Man" (1871); and the article "Ape" by St. George Mivart in vol. ii. of the "Encyclopædia Britannica" (9th ed., 1875).

QUÆSTOR (Lat., from *querere*, to seek), the name given to two classes of officers at Rome, the *quæstores parricidii* and the *quæstores classici*. The former have sometimes been confounded with the *perduellionis durumviri*, who had their origin in the time of the kings. Their duty was to bring accusations of capital offences, and to execute the sentence. After the establishment of the republic, *quæstores parricidii* were elected regularly every year by the curiæ. After the decemvirate they

were appointed by the centuries, and at the passage of the Licinian laws their functions were transferred to the *triumviri capitales*, ædiles, and tribunes. The *quæstores classici* had charge of the public money, registered and exacted fines, provided accommodations for foreign ambassadors and guests of the republic, took charge of the funerals and monuments of illustrious men buried at public expense, and kept the books in which the copies of the senate decrees were registered until the time of Augustus, when the originals were given into their hands. This office could only be held by patricians until 421 B. C., when the number, which previously had been two, was doubled, and the choice was not confined to either order; but it was not until ten years later that any plebeians were elected. Afterward the consuls in their campaigns were attended each by one quæstor, who originally took charge only of the sale of the spoils, but subsequently became the paymaster of the army. In 265 B. C. the number of quæstors was raised to eight, one of whom resided at Ostia and supplied Rome with corn. After this the number varied. By Sulla it was raised to 20, and by Julius Cæsar to 40. In 49 B. C. the latter also transferred the administration of the public treasury to the ædiles, subsequently to the prætors, and sometimes to the prefects of the treasury, and sometimes again to the quæstors. During the empire some quæstors were entitled *candidati principis*, and their duty was to read to the senate the communications of the emperor. From the reign of Claudius it became the custom of quæstors on assuming their office to give gladiatorial spectacles to the people, so that none but wealthy men were eligible; and the custom also prevailed in Constantinople after it became a capital of the empire.—Every prætor or proconsul was attended in his province by a quæstor, who, besides being paymaster of the army, raised the revenue not farmed out to the *publicani*, and controlled the latter also. When the prætor was away, the quæstor took his place, in which case he was attended by lictors. During the reign of Constantine, the title of *quæstor sacri palatii* was given to an officer in the imperial court, whose functions were somewhat analogous to those of a modern chancellor.—Any person who had held the office of quæstor was entitled to a seat in the senate, unless excluded by the next censors.

QUAGGA, a species of zebra, belonging to the asinine division of the horse family, and to the genus *asinus* as defined by Gray, characterized by a tail furnished with long hair only at the tip, the absence of horny warts on the hind legs, and a short and upright mane. The quagga (*A. quagga*, Gray) is about 4 ft. high at the shoulders; the neck and anterior parts of the body are dark brown, elegantly striped with broad black bands; the rest of the body paler brown, belly and legs white; a dark median line on the back extending to the tail. This beautiful species associates in large herds

with the gnu and ostrich, but not with other zebras, on the plains of S. Africa, and is rarely found north of the Gariep or Orange river; it is the most horse-like in structure of any of the group, having the form, light figure, and small head and ears of the horse, with the tail of the ass; Buffon regarded it as a hybrid



Quagga (*Asinus quagga*)

between a horse and a zebra. It is swift, and rather shy in its native state, strong, robust, and bold when attacked by hyænas or dogs; the voice resembles a barking neigh more than a bray, and has given to the animal the Hottentot name of quagga. It is the most easily domesticated of the zebras, and is docile, generally good-natured, and obedient, but disposed to kick at the sight of a dog. Its flesh, though coarse, is eaten by natives and hunters.

QUAHAUG. See CLAM.

QUAIL, the common name of several genera of the partridge division of gallinaceous birds. The American quails constitute the subfamily of *odontophorinæ* or *ortygina*, which have a short, high, and arched bill, compressed on the sides, with obtuse tip, the upper overhanging the lower mandible, and the latter with two teeth on each side concealed when the mandibles are closed; the wings moderate, concave, and rounded; tarsi generally slender, shorter than the middle toe, and covered with divided scales; toes long, the inner shorter than the outer; claws slightly curved and acute. In the genus *ortyx* (Steph.) the head is without crest, the bill broad, the third quill nearly as long as the fourth, fifth, and sixth, which are longest; tail short, broad, and rounded; toes slender, slightly united at the base by membrane; hind toe moderate and slightly elevated. There are about a dozen species, found in North and Central America and in the West Indies; they seek their food on the ground among the leaves, eating grains, seeds, berries, and insects, which they swallow with small pebbles or fine sand. The common quail, or Bob White (*O. Virginianus*, Bonap.), is about 10 in. long, with an alar extent of 15 in.; the

general color above is brownish red, especially on the wing coverts, tinged with gray and mottled with dusky on the upper back; chin, throat, forehead, and lines through the eyes



Common Quail (*Ortyx Virginianus*).

and along the sides of the neck, white; a black band across the top of the head, extending backward on the sides, and from the bill below the eyes crossing on the lower part of the throat; below white, tinged with brown anteriorly, each feather with black bands; the female has not the black marks, and the white on the head is replaced by brownish yellow. It is abundant in the eastern United States to the high central plains; the northern birds are largest and lighter colored, the southern with more black on the head, wings, and back; a smaller and more grayish variety in Texas has been separated as a species. The flight is rapid, low, and with numerous quick flappings. It takes to trees when alarmed, a flock dispersing in all directions and afterward coming together at the call of the leader. The males are very pugnacious, and in the breeding season utter the well known notes, "Ah Bob White," the first syllable rather low, but the others loud and clear; by some these notes are thought to resemble "more wet," and are therefore regarded as omens of rainy weather. The eggs are 10 to 18, pure white; the young run about as soon as hatched, but follow the old birds till spring, when they acquire their full plumage, pair, and breed; only one brood is raised in a season. They rest on the ground at night, arranged in a circle with their heads outward, so that each can fly off in a straight line, if alarmed, without interfering with the others; they are easily caught in snares and traps or driven into nets; they are difficult to raise from the egg, chiefly on account of the impossibility of obtaining the insects on which the young feed, but adults fatten well in captivity, eating grain, seeds, and berries; their flesh toward autumn is fat, juicy, and tender, white and highly esteemed; many perish from cold and hunger and from being

imprisoned under the snow during severe winters. There is great confusion about the name of this bird; it is called quail in the northern states, but in the middle and southern partridge; where the former name prevails the ruffed grouse is called partridge, and where the latter this grouse is styled pheasant; as neither the name quail, partridge, nor pheasant is properly given to any American bird, Mr. Baird proposes to call this species Bob White, and the other mountain grouse.—The genus *lophortyx* (Bonap.) has a crest of about half a dozen lengthened feathers, the shafts in the same vertical plane and the recurved webs overlapping each other; the bill weak; tail lengthened and graduated, of 12 stiff feathers, and nearly as long as the wings. Here belongs the beautiful California quail (*L. Californicus*, Bonap.), about 9½ in. long, with back and wings olivaceous brown, the secondaries and tertiaries edged with buff; breast and neck above plumbeous, the imbricated feathers on the latter with an edge and middle stripe of black; top of head brown, and crest black; throat black edged with white. This takes the place of the Bob White in California



California Quail (*Lophortyx Californicus*).

and Oregon.—The European quail belongs to the genus *coturnix* (Möhr.) of the partridge subfamily; in this the bill is short, elevated at the base and arched to the obtuse tip; wings moderate, with the second to the fourth quills the longest; tail very short, pendant, and mostly hidden by the coverts. There are about 20 species, scattered over Europe, Asia, and Australia, migrating in large flocks to warm regions in winter; some prefer cultivated districts, among tufts of grass, others rocky places, and others elevated table lands; the food and habits are as in other partridges. The European quail (*C. communis*, Bonn.) is 8 in. long, with an alar extent of 14 in.; the upper parts are variegated with reddish gray and brownish black, with whitish longitudinal streaks; throat of male dark brown, and

a double interrupted black band on the fore neck; throat of female yellowish gray; head completely feathered, with a white streak over the eyes. It is abundant in southern Europe,



European Quail (*Coturnix communis*).

India, and N. Africa; it was well known to the ancients, who employed it as a fighting bird for their amusement. The notes of the male, especially in moonlight nights in summer, are very clear and pleasing, and have acquired for it the specific name of *dactylosomans*. The Chinese quail (*C. Chinensis*, Edw.) is a smaller species, used in the East Indies as a fighting bird, and also for warming the owners' hands in winter.—The *turnicina* or bush quails of the old world have a moderate and usually straight bill, short wings, and tail almost concealed by the dorsal feathers; tarsi strong; toes usually three, long, and free at the base. In the genus *turnix* (Bonn.) the bill is curved, the tertials shorter than the primaries, and the first, second, and third quills equal and longest. There are more than 20 small species found in southern Europe, India and its islands, Africa, Madagascar, and Australia; they frequent open places near rivers, keeping near the ground when flying, and running rapidly among the grasses; the eggs are usually four. The *T. pugnax* (Lath.) of Java has the body varied with reddish black and white, beneath streaked with white and black, and throat black.

QUAKERS. See FRIENDS.

QUARANTINE (It. *quarantina*, Fr. *quarantaine*, a space of 40 days), a police regulation for the exclusion of contagious diseases from a city or state. Sanitary laws are founded upon the assumption that certain diseases depend upon a specific contagion, and their professed ends are to prevent the exportation, importation, and spreading of contagious pestilential disease. For the first we have a process of purification, for the second quarantine and lazarettos, and for the third lines of circumvallation and other modes of separation, seclusion, and restriction. The subjects of the

sanitary code are epidemic and pestilential diseases generally, of which cholera, plague, yellow fever, smallpox, typhus, and dysentery are the principal; but its operations have chiefly been directed against the supposed contagions of plague and yellow fever, and of late years have formed a feature in the sanitary police of domestic animals. Moses prescribed (Lev. xiii.) the most stringent precautionary measures to prevent the spread of disease. He not only ordered the lepers to be set apart from the rest of the people, but required that their clothes should be purified, and even that the garments belonging to the more aggravated cases should be burned. He gives explicit directions for the purification of the persons of those who have been cured of the disease, and also determines the time that the diseased shall dwell alone without the camp, as well as without their tent after being permitted to enter the camp. A peremptory sequestration of seven to fourteen days is also ordered for all those who had diseases of the skin. Long after Moses the religious laws were rigorously executed; and when the crusaders occupied Jerusalem, they established outside of the city an isolated place for the treatment of contagious diseases, called the hospital of St. Lazarus, whence the word *lazaretto*. Quarantine in Europe dates from the end of the 13th or the beginning of the 14th century, when leprosy prevailed in Italy and France. A military expedition returning from the Holy Land brought with it the Egyptian plague, which was looked upon as a new disease, and excited an unusual degree of attention from its great mortality and contagious character; it was soon discovered that those who avoided the sick escaped the disease. The first quarantine regulation originated with Viscount Bernabo of Reggio in Italy, and is dated Jan. 17, 1374. Yet the authorities of Florence are said to have used occasional precautions as early as 1348, and we see in Falasius that the emperors of the East had prescribed measures against those who arrived from places where plague prevailed, and it was at that time that the space of 40 days was fixed to observe them. The first quarantine regulations, founded on superstition and prejudice rather than reason and science, were most cruel and inhuman. The order of Bernabo required "every plague patient to be taken out of the city into the field, there to die or to recover." Their attendants were forbidden to associate with any one for ten days. Not only were these regulations strictly enforced, but in 1388 Bernabo forbade the admission of people from infected places into his territory, on pain of death. In course of time the benefits of these precautionary measures began to be understood and generally practised; but we have no account of any well defined legal code of regulations until about the middle of the 15th century, when the commerce of Venice was at its highest point. Robertson says this city

was not afflicted with plague while her commerce was limited or when it was dulled by the rivalries of the orientals; but when she had become strong enough to undertake conquests, when she covered the Mediterranean with her ships, and made commerce and war at the same time, she was invaded by a succession of plagues which originated in the Levant. In six centuries (from 901 to 1500) she had 63 epidemics. The Venetian senate in 1448 enacted a digest of laws known as the laws of quarantine. This system obliged all ships and individuals arriving from suspected places to undergo a term of probation before entering port and discharging their cargoes. The first organized lazaretto or pest house was erected in 1453 on the island of Sardinia, subsequently called *il lazaretto vecchio*; another was erected in 1468, called *il lazaretto nuovo*. All persons arriving from places where the existence of plague was suspected were detained there. The sick from the city laboring under the disease were sent with their families to the former station, and when cured were kept still 40 days longer in the latter. At a later period the republic of Venice established the first board of health, consisting of three nobles, who were appointed by the grand council. They were called the council of health, and were ordered to investigate the best means for preserving health and for preventing the introduction of disease from abroad. The efforts of this council not being entirely successful, in 1504 they were invested with the power of life and death over those who violated the regulations for health, and there was no appeal from their sentence. During the prevalence of plague in Italy about 1527 bills of health were first introduced, and in 1665 they had become general. Quarantines and lazarettos began to multiply along the shores of the Adriatic, and other nations established similar laws. Though certain preventive regulations had existed in England from a very early period, no regular system of quarantine was enforced until about 1710, when plague was raging in the towns on the Baltic. During the dreadful plague at Marseilles in 1720 the government appointed the celebrated Dr. Richard Mead to draw up quarantine regulations. Parliament, approving his suggestions, repealed the act of 1710, and passed an act establishing quarantine throughout the commercial kingdom. Yellow fever visited Philadelphia in 1699, and in 1700 the general assembly enacted the first quarantine law in this country, imposing a fine of £100 for every unhealthy vessel that landed. In 1701 a health law partly quarantine was enacted in Massachusetts. The first law on the subject in New York was passed by the colonial legislature in 1758. Congress passed "an act respecting quarantines and health laws," approved Feb. 25, 1799, which still stands upon the statutes. In 1831 cholera rode over all quarantine restraints; and these barriers being deemed antiquated,

reforms were suggested. On Aug. 18, 1847, a royal ordinance of France declared the first recognition of the truth, based upon the opinions of medical men, that many of the restrictions of quarantine were unnecessarily burdensome, and therefore they were abolished. Still other reforms were established by decrees of Aug. 10, 1849, and Dec. 24, 1850. Dupeyron suggested the idea of a sanitary congress. A convention of delegates from the principal countries in Europe met in Paris in 1851, and after a long discussion proposed an international code of quarantine laws, which was ratified by the nations represented. On the approach of cholera in 1865 the French government called an international sanitary conference at Constantinople. Since this discussion quarantine has been established on a scientific basis, and more in accordance with modern notions of liberty and justice.—Reviewing the history of quarantine, several periods may be distinguished. At first people, seized with terror, became panic-stricken; they wanted to be protected at any price. During this first period of superstition and terror, plague-stricken cities were burned; the sick were left alone to die; the shipwrecked from a suspected port were refused assistance; and physicians, afraid to approach their patients, threw bistouries at them from a distance in order to open their buboes. The second may be called the period of reaction. The atmosphere was considered as the vehicle of epidemics, and was supposed to transmit diseases to a great distance. Going to the opposite extreme, quarantines were declared useless. The cholera of 1830 furnished new arms to the adversaries of restrictive measures. The severe quarantines and cordons organized on a vast scale in Russia and Prussia, and other parts of central Europe, applied in the midst of dense populations, became mere propagating agents. With the conference of Constantinople the question enters on the third or scientific period, when the true principles of international hygiene became established. Why the term of 40 days was fixed upon as a proof whether people were infected, is not very clear. Some say it was chosen merely from superstitious notions, because people were accustomed to it in Lent; others that it arose from the doctrine of physicians in regard to the critical days of many diseases.—Communication with a country where a contagious disease exists may be interdicted by lines of troops or detachments posted from place to place. Some happy results may be cited in favor of these sanitary cordons applied at an opportune time and rigorously observed. Forts and villages in Orenburg and Astrakhan have been preserved from cholera by this means, as well as other towns in Russia, and also in Palestine and Arabia. The original lazaretto at Venice was the model for most of those forming part of the quarantine establishment in nearly all European ports. The old lazarettos are more dangerous than useful;

those of Ancona and the Dardanelles gave ample proof of this during the cholera epidemic of 1865. At the present day temporary lazarettos are considered the most desirable. Floating ones have lately been used in New York. In England there is no such thing as a lazaretto, though the quarantine act of July 28, 1800, provided for the erection of a lazaret on Chetney hill, in the county of Kent.—A rigorous quarantine consists in the sequestration and isolation of both ships and persons for a determined time, with disinfection of everything susceptible of concealing morbid germs. A quarantine of observation holds ship, crew, &c., under surveillance for a certain number of days; it may be enforced against a ship from a suspected port, or a ship in a filthy or unhealthy condition, although there may be no case of actual sickness on board. When a ship is about to sail, she is furnished by the consul of her country or other competent authority with a bill of health, which is her passport. It shows the sanitary state of the place of departure and of the points at which she has put in. A foul bill is delivered in a port where cholera, plague, or yellow fever prevails; a clean bill, where none of these diseases exist. The duration of quarantine is regulated by the nature of these documents. The declaration of the captain or master of the vessel, upon all incidents of the voyage having reference to the public health, is an act in certain circumstances of high importance. In 1865, upon false declarations made at Suez and at Constantinople, two captains obtained free entry into two ports; and the terrible consequences of these lying declarations are well known. Several countries where the cattle plague is regarded as exotic have enacted laws to prevent its spread; and an act of parliament is believed to have prevented its spread in Great Britain. Legal enactments of the same nature, only more stringent, prevail in France and Holland, and by the Ottoman government *peste bovine* is equally regarded with the plague, cholera, and yellow fever. An act of congress “to prevent the spread of foreign diseases among the cattle of the United States” was approved Dec. 18, 1865, and an act amending this, March 6, 1866. Cattle plague appeared simultaneously a few years ago in England and France, and the most rigorous methods were taken to strike at the root of the evil. In France it sufficed to kill 100 head of cattle to put an end to the progress of the epidemic. In England, owing to difference of opinion and insufficiency of legislation, things were allowed to take their natural course, and as many as 300,000 head of cattle were lost.—In the United States quarantine is exceedingly defective. Each state has laws of its own, which in many cases are absurd and conflict with one another. The law deserving most attention is that of the legislature of New York, Jan. 22, 1873, entitled “An act establishing a quarantine, and defining the qualifications, duties, and powers of the health

officer for the harbor and port of New York.” The quarantine establishment for the port of New York consists of warehouses, docks, and wharves, anchorage for vessels, a floating hospital, boarding station, burying ground, and residence for officers and men. Merchants are afforded facilities for overhauling and refitting vessels while in quarantine. Connected with the warehouses are apartments with appliances for special disinfection by forced ventilation, refrigeration, high steam, dry heat, and chemical disinfection. The boarding station for suspected vessels, arriving between the first day of April and the first day of November, is in the lower bay below the Narrows. Vessels are boarded as soon as practicable after their arrival, between sunrise and sunset. The anchorage for vessels under quarantine is in the lower bay, two miles from shore, and within an area designated by buoys. Quarantine applies against yellow fever, cholera, typhus or ship fever, and smallpox, and any new disease of a contagious, infectious, or pestilential nature. The floating hospital, with a capacity sufficient to accommodate 100 patients, is anchored in the lower bay from the first of May to the first of November; at other times it is anchored in some more secure place. The hospital at West bank, when so required, is used exclusively for yellow fever and cholera patients. The buildings on Hoffman island are used as a place of reception and temporary detention of persons who have been exposed to contagious or infectious diseases, but who are not actually sick. The health officer is the custodian of the quarantine establishment; his jurisdiction extends within the limits of the city and county of New York. In ascertaining the sanitary condition of a vessel he is authorized to examine under oath the captain, crew, and passengers, and to inspect the bill of health, manifest, log book, cargo, &c. Vessels liable to quarantine are required to discharge in quarantine, and be detained long enough thereafter for disinfection and aération, such detention not to exceed ten days unless the disease occurs or reappears during that interval, in which event the time is extended ten days. But no vessel or cargo which has been in quarantine is allowed to proceed to New York or Brooklyn without the approval of the mayor or board of health of those cities respectively. Filthy or unhealthy vessels are subject to quarantine for purification, not exceeding ten days. On infected or suspected vessels all clothing, personal baggage, cotton, hemp, rags, paper, hides, skins, feathers, hair, woollens, and other articles of animal origin, are subjected to an obligatory quarantine and purification. Molasses, sugar, and live and healthy cattle are subjected to quarantine at the option of the health officer. All other merchandise is exempted from quarantine and admitted without delay. The effects of persons who die in quarantine are taken in charge by the health officer, and if not claimed

by the rightful heir within three months are delivered to the public administrator of the city of New York. All persons who have died are interred without delay in the quarantine burying ground at Seguin's point. A vessel has the right to put to sea before breaking bulk, in preference to going into quarantine; but the health officer in such case indorses on her bill of health the circumstances under which she leaves port, the length of her detention, and her actual condition, and sends to the quarantine hospital such sick as may desire to remain. All passengers on board of vessels under quarantine are provided for by the master of the vessel. Any person violating the quarantine regulations, or who shall oppose or obstruct the health officer or any of his employees in the performance of their duties, is guilty of misdemeanor and punishable by a fine of not less than \$100, or by imprisonment not less than three nor more than six months, or by both such fine and imprisonment. Any person aggrieved by any decision of the health officer may appeal therefrom to the commissioners of quarantine, who constitute a board of appeal.—On June 6, 1872, congress passed a joint resolution providing for a more effective system of quarantine on the southern and gulf coasts. Dr. Harvey E. Brown of the army, being detailed in obedience to the resolution, made a thorough report, on the strength of which a national quarantine was proposed, and "An act to prevent the introduction of contagious or infectious diseases into the United States" passed the house of representatives, but did not become a law. Quarantine in France, under the new organization of 1850, founded upon the departmental division, comprises two elements: the one, active and responsible, representing authority; the other simply consultative, and representing the locality. The first is personified in an agent appointed directly by the minister, called director of health or principal agent, according as his duties are more or less circumscribed. The second is formed of a reunion of small functionaries and citizens taken from certain competent categories, and in particular from among the members of the council of hygiene and board of health. This organization is that of the large ports, which alone have a director and a special agent. In the others the service, reduced for economy to the strictest necessity, is done by secondary agents, principally employees of the custom house, who perform this service concurrently with their other functions. In India only limited measures have been taken to prevent the exportation of cholera. The "natives passenger act," promulgated by the government of India in 1858, only applies to the hygienic conditions and navigability of ships. The Dutch government, with a view to reducing the constantly increasing number of pilgrims who go from its possessions to Mecca, has established a regulation which may be beneficial in the future.—Many intelligent scientific ob-

servers have not only suggested sweeping and radical reforms in quarantine, but have questioned its utility and recommended its entire abrogation. In England, the general board of health, after close investigation, propose the entire discontinuance of quarantines, substituting for them a strict code of international hygienic regulations, and they unhesitatingly assert that quarantines are no public security. The doctrine of a specific contagion, so universally received when quarantines were first established, has lately undergone almost an entire revolution. Objections to new and more comprehensive measures of protection on the part of the general government of the United States cannot now be raised, as in the days of Jefferson, who in 1804, in a communication to congress on the state of the Union, protested against the adoption of a code of laws to prevent the introduction of yellow fever. The conference at Constantinople, although establishing the true principles of international hygiene, was occupied exclusively with their application to cholera. It is proposed that any resolutions adopted by a future convention should have for their common end the preservation of the healthy individual, and be founded upon a different principle: to regulate the isolation and sequestration of the human species, and to systematize the destruction of animals.

QUARLES. I. Francis, an English author, born at Stewards, Essex, in 1592, died Sept. 8, 1644. He was educated at Christ's college, Cambridge, studied law at Lincoln's Inn, was cupbearer for a while to the queen of Bohemia, and in 1621 went to Dublin, where he became secretary to Bishop Usher. Returning to England after several years' absence, he was appointed chronologer to the city of London, and devoted himself to literary labors until the rupture between the king and parliament, when his attachment to the royal cause plunged him into difficulties from which he never recovered. His best known writings are his "Divine Emblems" (1635) and "Enchiridion" (1641). The former, imitated from the *Pia Desideria* of the Jesuit Herman Hugo, consists of symbolical pictures with short moral lessons in verse; the latter is a collection of brief essays and aphorisms, in vigorous and occasionally eloquent language. Among his poetical works are: "Feast for Worms, or the History of Jonah" (1620); "Quintessence of Meditation" (1620); "Argalus and Parthenia" (1621); "History of Queen Esther;" an "Alphabet of Elegies" (1632), in memory of his friend Archdeacon Aylmer; "Hieroglyphics" (1638); "The Shepherd's Oracles" (1644); and "The Virgin Widow" (1649), a comedy. "The School of the Heart," attributed to him, is a translation of a Latin poem by Van Haeften of Antwerp, published anonymously in London in 1635. In most of these works he evinces strength of thought and considerable wit, but frequently becomes absurd and grotesque. His "Enchiridion" has been republished in Smith's "Li-

brary of Old Authors;" the "School of the Heart" and "Hieroglyphics" were reprinted in London in 1858, and the "Emblems" in 1859 and 1868. II. John, son of the preceding, born in Essex in 1624, died of the plague in London in 1665. He was educated at Oxford, assisted in defending the town against the parliamentarians, was a royalist captain, and retired to London after the king's overthrow. He wrote "Regale Lectum Miseriæ, or a Kingly Bed of Misery" (1648); "Fons Lachrymarum, or a Fountain of Tears" (1648); a continuation of the "History of Argalus and Parthenia" (1659); "Divine Meditations" (1665); and other works in verse and prose.

QUARTLEY, Arthur. See supplement.

QUARTZ, the most abundant of all minerals, existing as a constituent of many rocks, as the granitic and the micaceous and silicious slates, composing of itself the rock known as quartzite or quartz rock and some of the sandstones and pure sand, forming the chief portion of most mineral veins, and found interspersed in crystals and crystalline fragments throughout many rocks, and especially in their fissures and cavities. In composition it is silica, and when uncontaminated with any foreign intermixture it appears in clear transparent crystals like glass or ice. The presence of a little oxide of manganese gives these a violet tinge, and they are then known as amethyst. Other impurities which variously affect the appearance and properties of quartz, even in the small quantities in which they enter into its composition, are oxides of iron, aluminum, nickel, and other metals. Through all its varieties quartz is distinguished by the same chemical properties and degrees of hardness. This, which enables the mineral to scratch glass and to give fire when struck with steel, is represented by 7 of the scale of hardness. Its specific gravity is 2.5 to 2.8. Its lustre is vitreous, its colors various according to the impurities present, and its fracture conchoidal. It is fusible only at the intense heat of the oxyhydrogen blowpipe, and of the furnaces invented by Saint-Claire Deville; but it is readily fluxed with soda or lime. The quartz glass obtained by Deville, amounting to 30 grammes, possessed a density of only 2.2, or about one seventh less than that of the crystallized quartz from which it was melted. The colorless, transparent crystals impress circular polarization upon a ray of plane-polarized light. They exhibit double refraction when the object is observed through two faces which are not parallel to each other. Milk-white varieties often give a phosphorescent light when rubbed together in the dark. The primary form of the crystal, which is very rarely seen, is a rhomboid. The common form is a hexagonal prism terminated by hexagonal pyramids. The crystals occur in groups of great beauty and of all sizes up to single crystals of several hundred pounds' weight. In the museum of the university at Naples is a group weighing nearly

half a ton. In Milan is a crystal $3\frac{1}{4}$ ft. long and $5\frac{1}{4}$ ft. in circumference, estimated to weigh 870 lbs. A crystal in the museum of natural history in Paris is 3 ft. in diameter and the same in length, and weighs 800 lbs. Occasionally immense quantities of crystals are found collected in cavities in the rocks and in caves, loose and incrusting the walls. Such a collection, discovered at Zinken more than a century ago, produced 1,000 cwt. of rock crystal, which at that period, when the article was more highly valued than now, brought \$300,000. In the United States some rich deposits have been met with in the Ellenville lead mine, Ulster co., N. Y., and in some of the southern gold mines; and large groups of fine crystals have been found in Moose mountain, N. H., and in Waterbury, Vt. Little Falls on the Mohawk in New York is a famous locality for the purest transparent crystals of complete forms, and they are met with in other places also in the same region, occurring in the cavities of the calciferous sand rock, which overlies the Potsdam sandstone. Trenton Falls also furnishes perfect transparent crystals, which are sometimes 5 in. long and contain drops of water. These are occasionally recognized in quartz crystals of various localities. In St. Lawrence and Jefferson cos., N. Y., in the deposits of iron ore, quartz crystals are found of dodecahedral forms. In Orange co., 4 m. E. of Warwick, they occur in the primary form. Many of the varieties of quartz are known by other names, under which they have been particularly described in this work. (See AGATE, AMETHYST, CARNELIAN, CATS' EYE, CHALCEDONY, FLINT, GEODE, and JASPER.)—Clear crystalline quartz, called rock crystal, was in former times esteemed for ornamental objects. It was cut into vases, cups, lustres, &c., many of which are still preserved as curiosities. In the museum of the Louvre are great numbers of them, some belonging to the times of the ancient Greeks and Romans, but more generally of the period of the middle ages. The perfection to which the manufacture of glass and pastes has been brought and the cheapness of these materials have almost completely taken away the value of rock crystal, which requires a great amount of labor in its cutting and polishing, and after all is not really superior to the artificial products. But some use is still made of it, as for buttons, seals, breast pins, &c. It is procured from Madagascar, Switzerland, and Brazil. Very transparent specimens from the latter country are made into spectacle lenses called "Brazilian pebbles." They are superior to glass on account of their greater hardness. In Switzerland quartz veins which occasionally yield rich cavities of crystals are regularly mined for this product. From Madagascar large clear masses are received, which sell for from \$1 to \$10 a pound. When cut and set by the jewellers, the stone is commonly sold as white topaz, and sometimes as "California dia-

monds." Pure quartz is largely employed in the manufacture of glass, and is commonly obtained for this purpose in the form of sand; but metamorphic quartz rock of a granular structure and crumbly consistency is also used. (See GLASS.) Varieties of quartz of a cellular texture and great tenacity are used for mill-stones, the roughness and hardness of their surface and sharpness of the edges of the cells giving them a powerful grinding capacity combined with durability. (See BURSTONE.) Quartz veins with few exceptions form the gangues in which gold is found *in situ*, and it is probable that most of the gold which is obtained from alluvial and drift deposits came originally from the quartz veins. These gold-bearing quartz veins intersect various metamorphic rocks, such as chloritic, talcose, and argillitic schist, hornblende schist, gneiss, porphyry, and sometimes granite. (See GOLD.)

QUASSIA, a bitter drug, the properties of which, it is said, were first made known to Europeans by a negro slave named Quassi; the tree producing it was named *Quassia amara* by Linnaeus, and belongs to the *simarubææ*. Its wood is intensely bitter, and is sold in billets 2 to 4 in. in diameter. The supply of the drug originally came from Surinam; small quantities are exported to Europe, and under the name of Surinam quassia it is still used in Germany and France. Toward the end of the last century it was discovered that a tree known in Jamaica and neighboring islands as bitterwood and bitter ash had properties almost identical with the quassia; being much more abundant and in much larger pieces than the Surinam drug, this has almost entirely sup-



Bitterwood (*Picræna excelsa*).

planted it, and, though afforded by a different tree, the drug is called quassia. The tree is *picræna excelsa*, an allied genus in the same family with the other, having the general appearance of an ash, inconspicuous, greenish flowers, and black drupes the size of a pea.

The wood is imported in logs, sometimes a foot thick, with a smooth brittle bark; it is kept in the form of chips or turnings, which are nearly white when first cut, but become yellowish by exposure; it has no odor, and a strong, pure bitter taste, which is imparted to water and to alcohol. A neutral substance, to which the bitterness is due, has been separated and called quassine.—The properties of quassia are those of the simple bitters, and as a medicine it is adapted to cases of dyspepsia and the debilitated state of the digestive organs which sometimes succeeds acute disease. Animals have been killed by concentrated preparations of the drug. A sweetened decoction is sometimes used for poisoning flies. It is given in the form of cold infusion and in tincture. Bitter cups or quassia cups were at one time very popular; these are goblets turned from the wood, which quickly impart a bitter taste to wine, water, or other liquid placed in them. The decoction was formerly used in England by some of the brewers as a substitute for hops, but this is now prohibited under severe penalties.

QUATRE BRAS. See WATERLOO.

QUATREFAGES DE BRÉAU, Jean Louis Armand de, a French naturalist, born near Vallerangue, department of Gard, Feb. 10, 1810. He graduated doctor in medicine and science at Strasburg in 1829, published papers *Sur les aérolithes* (1830), and *De l'extraversion de la vessie* (1832), and, while assistant professor of chemistry in the medical faculty at Strasburg, wrote extensively for scientific periodicals. In 1838 he was appointed professor of zoölogy at Toulouse, in 1850 professor of natural history in the *lycée Napoléon*, in 1852 member of the academy of sciences, and in 1855 professor of anatomy and ethnology in the museum of natural history. Among his publications are: *Considérations sur les caractères zoologiques des rongeurs* (4to, 1840); *De l'organisation des animaux sans vertèbres des côtes de la Manche* (1844); *Recherches sur le système nerveux, l'embryogénie, les organes des sens et la circulation des annélides* (1844-'50); *Sur l'histoire naturelle des turets* (1848-'9); *Sur les affinités et les analogies des lombrics et des sangsues* (1852); *Souvenirs d'un naturaliste* (2 vols. 12mo, 1854; English translation, 2 vols., London, 1857); *Unité de l'espèce humaine* (1861); *Métamorphoses de l'homme et des animaux* (1862; English translation by H. Lawson, 1864); *Histoire naturelle des annélés marins et d'eau douce* (1865 et seq.); *Les Polynésiens et leurs migrations* (1866); *Rapport sur les progrès de l'anthropologie* (1867); *Le vers à soie* (1869); *Histoire de l'homme* (1869; English translation by Miss Eliza Youmans, New York, 1875); *Charles Darwin et ses procureurs français: étude sur le transformisme* (1870); *La race prussienne* (1871); and, in conjunction with E. T. Haury, *Crania Ethnica: Les crânes des races humaines décrits et figurés* (1875 et seq.).

QUATREMÈRE, Étienne Mare, a French orientalist, born in Paris, July 12, 1782, died Sept. 18, 1857. He was a pupil of Sylvestre de Sacy and Chézy. In 1809 he became professor of Greek literature at Rouen, in 1819 was called to the collège de France to teach Hebrew, Chaldaic, and Syriac, and in 1827 became professor of Persian at the school of the living eastern languages. To him is mainly owing the identification of the modern Coptic as a derivative of the language of the ancient Egyptians, which gave an important clue to the interpretation of the latter. He wrote *Recherches historiques et critiques sur la langue et la littérature de l'Égypte* (1808); *Mémoires géographiques et historiques sur l'Égypte* (1810); and *Observations sur quelques points de la géographie de l'Égypte* (1812). His editions and translations of Rashid ed-Din's *Histoire des Mongols en France* (1836) and Makrizi's *Histoire des sultans mamlouks en Égypte* (1837-'40) are of special value. His library was bought by the king of Bavaria and removed to Munich.

QUATREMÈRE DE QUINCY, Antoine Chrysostome, a French archaeologist, born in Paris, Oct. 28, 1755, died Dec. 28, 1849. In 1785 a paper *Sur l'architecture égyptienne* secured for him a prize from the academy of inscriptions; he was then engaged as a contributor to the *Encyclopédie méthodique*, for which he wrote a *Dictionnaire de l'architecture* (3 vols. 4to, 1786-1825). He took an active part in the events of the French revolution, and held several political offices under the republic, consulate, and empire, and after the restoration. In 1815 he was appointed superintendent of public monuments, and in 1818 professor of archaeology in the royal library; and he was secretary general of the academy of fine arts from 1816 to 1839. Among his voluminous works are: *Le Jupiter olympien* (fol., 1814), a restoration of the great work of Phidias; *De l'imitation dans les beaux arts* (1823; English translation by J. C. Kent, 8vo, 1837); *Histoire de la vie et des ouvrages de Raphaël* (1824); *Canova et ses ouvrages* (1834); and *Histoire de la vie de Michel-Ange* (1835).

QUEBEC (formerly LOWER CANADA or CANADA EAST), a province of the Dominion of Canada, situated between lat. 45° and 53° 30' N., and lon. 57° 8' and 79° 30' W.; area, according to the latest estimates, 193,355 sq. m. It is bounded N. by the Northwest territories and the portion of Labrador belonging to Newfoundland; E. by Labrador and the gulf of St. Lawrence; S. and S. E. by the gulf of St. Lawrence, New Brunswick, Maine, and New Hampshire, then S. by Vermont and New York; and S. W. and W. by the province of Ontario, from which it is mostly separated by the Ottawa river. The N. boundary line, formed by the height of land which separates the waters that flow into the river and gulf of St. Lawrence on the one hand from those that flow into Hudson bay and those that reach the Atlantic through the Labrador coast on the other, is

irregular, and has not been surveyed. The E. limit is a line drawn due N. and S. from Blanc Sablon bay (at the W. entrance of the strait of Belle Isle) to the 52d parallel. From Lake Temiscamingue, on the Ontario border, N. E. to Blanc Sablon bay, is about 1,050 m.; E. to the extremity of the Gaspé peninsula, 700 m.; S. E. to the angle formed by the boundary with Vermont and New Hampshire, 400 m. The general breadth N. and S. is about 125 m. E. of the mouth of the St. Lawrence river and about 250 m. W. of that. Exclusive of the cities of Montreal and Quebec, each containing three electoral districts, the province is divided into 59 electoral districts or counties, viz.: Argenteuil, Bagot, Beauce, Beauharnois, Bellechasse, Berthier, Bonaventure, Brome, Chambly, Champlain, Charlevoix, Chateauguay, Chicoutimi and Saguenay, Compton, Dorchester, Drummond-Arthabaska, Gaspé, Hochelaga, Huntingdon, Iberville, Jacques Cartier, Joliette, Kamouraska, Laprairie, L'Assomption, Laval, Lévis, L'Islet, Lotbinière, Maskinongé, Mégantic, Missisquoi, Montcalm, Montmagny, Montmorency, Napierville, Nicolet, Ottawa, Pontiac, Portneuf, Quebec, Richelieu, Richmond-Wolfe, Rimouski, Rouville, Shefford, Sherbrooke, Soulanges, St. Hyacinthe, St. Johns (St. Jean), St. Maurice, Stanstead, Témiscouata, Terrebonne, Three Rivers (Trois Rivières), Two Mountains (Deux Montagnes), Vaudreuil, Verchères, and Yamaska. Quebec (pop. in 1871, 59,699) is the capital and Montreal (pop. 107,225) the commercial metropolis of the province. There are two other cities, Three Rivers (pop. 7,570) and St. Hyacinthe (pop. 3,746). Lévis (pop. 6,691), Sorel (5,636), Sherbrooke (4,432), Joliette (3,047), and St. Johns (3,022) are incorporated towns. Other towns and villages, having each more than 1,000 inhabitants, are Aylmer, Berthier, Beauharnois, Buckingham, Chicoutimi, Coaticook, Farnham, Fraserville, Hull, Lachine, Laprairie, L'Assomption, Longueuil, Montmagny, Rimouski, St. Jérôme, and Terrebonne. The population of the province in 1676 was 8,415; in 1734, 37,252; in 1770, 91,078; in 1780, 127,845; in 1827, 423,378; in 1831, 511,920; in 1844, 690,782; in 1851, 890,261; in 1861, 1,111,566; in 1871, 1,191,516. Of the last number, 596,041 were males and 595,475 females; 1,104,401 were born in the province, 7,018 in Ontario, 2,746 in other parts of British America, 12,371 in England, 35,828 in Ireland, 11,260 in Scotland, and 14,714 in the United States; 929,817 were of French, 123,478 of Irish, 69,822 of English, 49,458 of Scotch, 7,963 of German, and 148 of African origin; and 6,988 were Indians, chiefly Algonquins, Iroquois, Abenakis, Hurons, Micmacs, Malicetes, Montagnais, and Nasquapees. There were 191,862 persons 20 years old and over (107,782 males and 84,080 females) unable to read, and 244,731 (123,926 males and 120,805 females) unable to write; 180,615 occupied dwellings, 213,303 families, 1,630 deaf and

dumb persons, 1,023 blind, and 3,300 of unsound mind. Of the 341,291 persons returned as engaged in occupations, 160,641 belonged to the agricultural, 25,507 to the commercial, 21,186 to the domestic, 65,707 to the industrial, and 15,376 to the professional class, and 52,874 were unclassified. A large portion of the inhabitants live in the region S. of the St. Lawrence and W. of the meridian of Quebec. This region is known as the "eastern townships," though the term in strictness is confined to the district between the Chaudière and Richelieu rivers in the rear of the settlements immediately along the St. Lawrence. E. of Quebec the settlements S. of the St. Lawrence extend to and around the extremity of the Gaspé peninsula, but for the most part they are closely confined to the shore. N. of the St. Lawrence and below the mouth of the Saguenay there are only a few scattered fishing settlements, and above that the settlements for the most part extend only a few miles from the river. In the valley of the Ottawa, however, and on the upper Saguenay and around Lake St. John, there is a considerable population. A great majority of the inhabitants speak the French language, but English may also be used in legislative and judicial proceedings, and the laws must be printed in both languages. The greater part of the English-speaking population is in the cities of Montreal and Quebec, in the S. part of the eastern townships, and in the valley of the Ottawa. Recently efforts have been made to colonize the unsettled portions of the province; colonization societies have been formed to aid settlers, and roads have been built by the government; but the access of population from abroad has not been equal to the emigration from the province to the United States.—The region S. of the St. Lawrence is generally hilly; N. of that river the country is for the most part rocky and mountainous. The Notre Dame mountains, a continuation of the Green mountains of Vermont, stretch E. from the meridian of Quebec, passing through the interior of the Gaspé peninsula to near its extremity, and attaining in places a height of 3,000 or 4,000 ft. This elevation is reached near the Cape Chatte river, in a portion of the range called the Shickshock mountains. The Laurentian mountains, on the north of the river St. Lawrence, extend from the Labrador coast to the Ottawa river above the city of that name. They lie near the margin of the St. Lawrence as far up as Cape Tourmente near the city of Quebec, above which they recede N., passing 60 m. behind Quebec and 30 m. behind Montreal. This range, between Quebec and Lake St. John, where the rivers are 3,000 ft. above the level of the St. Lawrence, attains an elevation of from 4,000 to 5,000 ft. above the sea, but in general its height is much less. The province has a coast line on the gulf of St. Lawrence, not including indentations of the land, of 1,164 m. There are many small bays on the coast N. of the river St. Lawrence; the

principal ones S. of it are Gaspé bay and the bay of Chaleurs. The latter, lying between the province and New Brunswick, includes with the mouth of the St. Lawrence the peninsula of Gaspé. Except those in the St. Lawrence, the principal islands belonging to the province are Anticosti (2,500 sq. m.), at the mouth of that river, and the Magdalen islands in the gulf. The St. Lawrence, flowing in a N. E. direction for more than 500 m. through the province, and rendered navigable the entire distance by canals around the rapids, is the great avenue of commerce. Vessels may ascend from the gulf of St. Lawrence to the head of Lake Superior. It contains numerous islands, the largest of which are Orleans (69 sq. m.) just below Quebec, Montreal (169 sq. m.) at the mouth of the Ottawa, and Isle Jésus (85 sq. m.) N. of Montreal and separated from it by a narrow channel. The largest tributaries of the St. Lawrence are from the north; the principal ones from the south, proceeding down the stream, are the Chateauguay, which rises in New York and is navigable for a considerable distance by bateaux; the Richelieu, also called the Chambly, Sorel, or St. Johns, 80 m. long, the outlet of Lake Champlain; the Yamaska, 90 m. long; the St. Francis, more than 100 m. long, which receives the Magog, the outlet of Lake Memphremagog, and empties into the St. Lawrence at Lake St. Peter; the Nicolet, 60 m. long; the Bécancour, 70 m. long; the Chaudière, 120 m., emptying into the St. Lawrence a few miles above Quebec; the Etchemin, 50 m. long; the Rimouski; the Métis; the Matane, 60 m. long; and the Cape Chatte river, entering the St. Lawrence at Cape Chatte. By means of the Richelieu river, Chambly canal, Lake Champlain, the Champlain canal, and the Hudson river, there is continuous water communication between the St. Lawrence and New York. The largest tributaries from the north, lying wholly within the province, are the Saguenay and the St. Maurice. The former flows out of Lake St. John, and after a course of upward of 100 m. joins the St. Lawrence 120 m. below Quebec. It has an average width of about three fourths of a mile, with high precipitous banks. It is navigable by the largest vessels to Chicoutimi, 75 m. above its mouth. During the summer the Saguenay is much visited by tourists, and the ancient port of Tadousac at its mouth is a favorite watering place. The St. Maurice rises in the height of land, and after a course of more than 400 m. discharges into the St. Lawrence at Three Rivers. Its banks are generally high, and it contains numerous falls, and has many important tributaries. It is navigable for a few miles at its mouth; the navigation is then interrupted for about 40 m., above which there is a navigable stretch of 75 m. Other important tributaries of the St. Lawrence from the north are the Portneuf, the Betsiamites or Bersimis (navigable for a considerable distance), the rivière aux Outardes,

and the Manicouagan, below the Saguenay; the Jacques Cartier (60 m. long), the St. Anne (70 m.) and the Batiscan (50 m.), between Quebec and the St. Maurice; and the Du Loup, the Maskinongé, and L'Assomption (100 m. long), above the St. Maurice. The Ottawa river rises in the W. part of the province, and has a tortuous course, first in a N. W., then in a W. direction, of 300 m. to Lake Temiscamingue on the Ontario border, below which, flowing S. E., it forms the boundary between the two provinces for 400 m., emptying into the St. Lawrence just above the island of Montreal. It is navigable along the border for more than 250 m., the rapids and falls being avoided by means of canals. The only portion of the province of Quebec W. of the Ottawa is the angle made by that river with the St. Lawrence, comprising the counties of Soulanges and Vaudreuil. The chief tributaries of the Ottawa from this province are the Keepawa, 120 m. long, which enters Lake Temiscamingue; the Du Moine, having about the same length; the Gatineau, 400 m. long, which joins the main stream nearly opposite the city of Ottawa, and is navigable by canoes for more than 300 m.; the Du Lièvre, 260 m. long; the North Petite Nation, 95 m.; the Rouge, 90 m.; and North river or rivière du Nord, 160 m. The E. part of the province is drained by numerous streams that flow into the gulf of St. Lawrence from the north. Among these, proceeding toward the east, are the Moisie, Manitou, Magpie, St. John, Mingan, Natashquan, St. Augustine, and Esquimaux or St. Paul. In the south, portions are drained by tributaries of the St. John and the Restigouche, the latter flowing into the bay of Chaleurs and forming a part of the boundary with New Brunswick. Its chief tributary from Quebec is the Matapediac. The chief tributaries of the St. John are the St. Francis, which forms a part of the boundary with Maine, and the Madawaska, which flows into New Brunswick. The principal rivers of the peninsula of Gaspé are the Grand and Little Cascapediae and the Bonaventure, which empty into the bay of Chaleurs; the Mal Baie, St. Johns, York, and Dartmouth, flowing into the gulf of St. Lawrence from the west; and the Madeleine and St. Anne, emptying into the gulf from the south. There are numerous lakes, particularly in the northwest, where the country is covered by a network of them, the rivers here being little else than chains of lakes. The most important ones S. of the St. Lawrence are Memphremagog, partly in Vermont; Mégantic, which discharges through the Chaudière river; Témiscouata, discharging through the Madawaska river; and Matapediac, discharging through the river of the same name. The largest in the province is Lake St. John, 80 by 25 m. in extent, about 120 m. N. of Quebec, in which the Saguenay river takes its rise. This lake lies in an extensive valley, and receives numerous large streams, some of which

rise in the height of land. The largest of its tributaries are the Peribonka, from the northeast; the Mistassini and Ashuapmouchouan or Chamouchouan, from the northwest; and the Ouatouchouanish, Ouatouchouan, Metabetchouan, Kushpahiganish, and Belle Rivière or Kushpahigan, from the southwest and south. Lake St. Peter is an expansion of the St. Lawrence between Montreal and Quebec.—The geological formations that occur in the province are the Laurentian, Silurian, Devonian, and carboniferous. The region N. of the St. Lawrence is occupied by the lower Laurentian, with small areas of upper Laurentian around Lake St. John and N. of Montreal, and a narrow belt of lower Silurian along the river bank above Quebec. S. of the St. Lawrence the country consists of different groups of the lower Silurian, followed S. E., along the borders of New Hampshire, Maine, and New Brunswick, by smaller tracts of middle and upper Silurian, with areas of the Devonian in the Gaspé peninsula. Anticosti is occupied by the lower and middle Silurian. The Magdalen islands are of carboniferous formation below the coal measures. Gold is found on the Chaudière river, and mining has been carried on in Beauce co., but with little success. Copper is found in large quantities in the eastern townships, where mines are in operation. Iron ore is widely diffused, and is mined to some extent. An ore of excellent quality is obtained near the St. Maurice river. Lead, silver, platinum, zinc, &c., have also been found. Quebec abounds in magnificent scenery, especially on the lower St. Lawrence and Saguenay. Among objects of interest may be mentioned the Chaudière falls in the Ottawa, the falls of the Chaudière river, the falls of Montmorency near the city of Quebec, and the falls of the St. Anne 20 m. below it.—The climate is healthy, but subject to extremes of temperature. The winters are cold, with a clear and bracing air; the summers are warm. Winter commences about the end of November and lasts till the middle of April. The plateau of Lake St. John is sheltered on the north and east by mountains, and has a climate like that of Montreal. The shores of the Gaspé peninsula are exposed to the cold winds and fogs of the gulf. In the N. E. part of the province, comprising a portion of the peninsula of Labrador, the climate is much colder than elsewhere. The following table gives the results of observations for a series of years at Montreal (lat. 45° 31') and Quebec (lat. 46° 49'):

SEASON.	MONTREAL.		QUEBEC.	
	Mean temperature.	Rainfall, inches.	Mean temperature.	Rainfall, inches.
Autumn.....	47·3°	10·35	44·6°	6·65
Winter.....	18·1	1·91	13·8	0·25
Spring.....	42·5	5·72	87·6	2·70
Summer.....	69·5	9·80	66·0	9·66
Year.....	44·8°	27·26	40·5°	19·26

The highest temperature observed at Montreal during the period was 96.1°; lowest, -28°. The highest observed at Quebec was 94.4°; lowest, -30.5°. The annual precipitation of rain and melted snow at Montreal is 37.54 inches; at Quebec, 31.84 inches.—The soil of the valley of the St. Lawrence and of the “eastern townships” is generally fertile. The townships are a fine grazing country, and much attention is paid to the raising of cattle and wool. On either side of the Notre Dame mountains, W. of the Gaspé peninsula, there is much good soil. The peninsula is generally rocky, but contains considerable arable land, particularly along the bay of Chaleurs. On the upper Saguenay and around Lake St. John there is an extensive region suited to agriculture, and the basin of the St. Maurice contains many fertile valleys. In the basin of the Ottawa also there are extensive tracts of good land. The Labrador portion of the province is rocky and sterile, and its climate too severe for agriculture. The greater portion of the province is covered with forests, the most common and important trees being the red and white pine. Other species are the ash, birch, beech, elm, hickory, black walnut, maple, cherry, butternut, basswood, spruce, fir, and tamarack. Hard wood is most common S. of the St. Lawrence. Lumbering is very extensively carried on, particularly on the tributaries of the Ottawa, St. Maurice, and Saguenay. The timber lands are leased by the government for a term of years for a certain bonus and annual rents. Oats, potatoes, and hay are the largest crops. Wheat, barley, rye, peas, beans, buckwheat, Indian corn, turnips, flax, apples, tobacco, hops, &c., are also grown. Except in the S. W. portions, the climate is too cool for Indian corn. The island of Montreal is noted for the excellence of its apples, and the island of Orleans for its plums. The wild animals are similar to those of other parts of British America. Fur-bearing animals are still trapped in the N. and N. E. portions of the province, where the Hudson Bay company has several posts. The manufactures are of considerable value, though they have not yet been extensively developed. Among the principal articles produced are flour, lumber, furniture, leather, hardware, paper, chemicals, soap, boots and shoes, cotton and woollen goods, steam engines, and agricultural implements. Ship building is carried on chiefly at Quebec. Home-made woollen and linen cloths are extensively worn by the rural population. (For statistics of agriculture, manufactures, &c., see APPENDIX to vol. xii.) The gulf of St. Lawrence abounds in fish, and the fisheries are extensively pursued on the Labrador coast, around the shores of the Gaspé peninsula, and at the Magdalen islands. The value of the fisheries for the year ending June 30, 1874, was \$1,608,660 20. The chief items of catch were cod, herring, salmon, seals, mackerel, and lobsters. The value of fish oil preserved, included in the above figures, was \$89,211 60,

viz.: cod oil, \$48,854 50; seal oil, \$27,047 50; whale oil, \$13,296; porpoise oil, \$13 60.—In respect to foreign commerce Quebec is the first province in the Dominion. The value of goods entered for consumption from foreign countries during the year 1873-'4 was \$51,980,870, including \$32,749,883 from Great Britain, \$12,703,967 from the United States, \$1,530,152 from France, \$939,451 from the West Indies, \$737,866 from Germany, \$677,017 from China, \$528,232 from Newfoundland, \$452,486 from South America, \$352,934 from Spain, \$295,958 from Japan, \$283,956 from Belgium, \$243,782 from the East Indies, \$204,581 from Holland, and \$138,712 from Switzerland. The principal articles of import were manufactures, including cottons, woollens, fancy goods, silks, iron and hardware, and machinery, besides sugar and molasses, tea, tobacco and cigars, wine, brandy and other spirits, coal, wheat, &c. The value of exports to foreign countries was \$46,393,845, of which \$36,099,441 were to Great Britain, \$5,812,596 to the United States, \$967,615 to South America, \$813,888 to Newfoundland, \$255,267 to the British West Indies, \$237,259 to France, \$229,480 to Belgium, \$169,528 to Italy, and \$169,150 to Portugal. Of the whole amount \$9,405,600 represented goods not the produce of Canada, \$901,703 coin and bullion, \$653,869 the estimated amount not returned at inland ports, and \$35,432,673 Canadian produce, viz.: of the mine, \$216,414; of the fisheries, \$778,672; of the forest, \$13,115,106; animals and their produce, \$8,189,613; agricultural products, \$11,256,057; manufactures, \$917,404; miscellaneous articles, \$162,732; new ships, \$796,675. The number of entrances from sea was 1,501, tonnage 1,135,560; clearances for sea, 1,493, tonnage 1,087,151; entrances in inland navigation from the United States, 2,793, tonnage 288,862; clearances in inland navigation for the United States, 1,487, tonnage 216,990; total entrances in the foreign trade, 4,294, tonnage 1,424,422; total clearances, 2,980, tonnage 1,304,141. The number of vessels built during the year was 63, with an aggregate tonnage of 22,189; belonging in the province at the close of 1874, 1,837 vessels, with an aggregate tonnage of 218,946. The following is a comparative statement of the foreign commerce for the six years ending June 30, 1874:

YEARS.	Imports.	Entered for consumption.	Exports.
1869.....	\$30,040,341	\$29,545,177	\$28,223,268
1870.....	32,883,916	32,166,283	37,807,463
1871.....	43,094,412	40,105,120	39,021,706
1872.....	49,376,175	47,738,687	41,228,470
1873.....	53,715,450	54,231,158	44,408,033
1874.....	51,557,072	51,980,870	46,393,845

—The province is connected with Ontario and the United States by several lines of railway, the statistics of which for 1875 are contained in the following table:

LINES.	TERMINI.	Miles in operation in the province.
Grand Trunk, W. division.....	Montreal to Detroit, Mich. (564 m.).....	45
" " E. division.....	Montreal to Trois Pistoles.....	816
" " Portland division.....	Richmond to Portland, Me. (221 m.).....	54
" " Three Rivers branch.....	Arthabaska to Doucet's Landing (opposite Three Rivers).....	85
" " Champlain division.....	St. Lambert to Rouse's Point, N. Y.....	42
" " Lachine and Province Line division.....	Montreal to Province Line.....	40
Massawippi Valley.....	Sherbrooke to Newport, Vt. (40 m.).....	34
Montreal and Vermont Junction.....	St. Johns to Burlington, Vt. (73 m.).....	26
Montreal, Chambly, and Sorel.....	St. Lambert to West Farnham.....	28
Quebec and Gosford.....	Quebec to Gosford.....	56
St. Lawrence and Industry.....	Lanoraie to Joliette.....	12
Southeastern.....	West Farnham to Newport, Vt. (65 m.).....	32
Stanstead, Shefford, and Chambly.....	St. Johns to Waterloo.....	48
Total.....		768

The Intercolonial railway is intended to be extended from Moncton, New Brunswick, N. and then W. to Rivière du Loup on the St. Lawrence. There are other lines projected or in progress. There were 19 banks on Sept. 30, 1874, with an aggregate paid-up capital of \$42,351,464.—The executive power is vested in a lieutenant governor, appointed by the governor general of the Dominion in council, assisted by an executive council of seven members (secretary and registrar and minister of public instruction, treasurer, attorney general, commissioner of crown lands, commissioner of agriculture and public works, president of legislative council, and solicitor general) appointed by himself and responsible to the assembly. The legislative authority is exercised by a legislative council of 24 members, appointed by the lieutenant governor in council for life, and a legislative assembly of 65 members (one from each electoral district), elected by the qualified voters for four years. The right of suffrage is conferred on all male British subjects 21 years old and upward who possess a small property qualification. Voting is by ballot. For judicial purposes the province is divided into 20 districts. The principal courts are the queen's bench, consisting of a chief justice and four puisné judges, and the superior court, with a chief justice and 25 puisné judges. These judges are appointed by the governor general of the Dominion in council during good behavior. The queen's bench sits four times a year at Montreal and as frequently at Quebec for the purpose of hearing appeals. Trial terms are held twice a year in different parts of the province by a single judge, in criminal cases with a jury. Three judges of the superior court sit in review of judgments of a single judge at the superior and circuit courts. Superior courts, with jurisdiction of sums exceeding \$200, are held three times a year in each judicial district by a single judge. Circuit courts, with jurisdiction of sums not exceeding \$200, are held in each county by a judge of the superior court. A vice-admiralty court is held at Quebec by a judge of vice-admiralty. Justice is administered according to the *Code civil de Québec*, which is based mainly upon the *coutume de*

Paris and the edicts and ordinances of the French kings in force at the time of the cession to Great Britain. The province is represented in the Dominion parliament by 24 senators and 65 members of the house of commons (one from each electoral district). The balance in the provincial treasury on June 30, 1873, was \$948,001 43; receipts during the following year, \$2,041,174 71, including \$1,014,712 12 subsidy from the Dominion government, \$542,140 72 from the crown lands department, \$121,540 98 from law stamps, and \$141,597 72 from licenses, &c. The expenditures amounted to \$1,992,594 88, including \$54,822 84 outstanding warrants; balance in treasury on June 30, 1874, \$1,051,404 10. The chief items of expenditure were as follows: legislation, \$173,292 98; civil government, \$146,766 41; administration of justice, \$364,555 29; police, \$63,292 20; reformatories, \$38,000; education, \$320,166 07; agriculture, \$61,852 15; immigration, \$48,978 79; colonization roads, \$114,525 76; public works and buildings, \$161,147 42; charities, \$218,224 85; crown lands department, \$128,574 82; subsidy to Southeastern railway, \$38,700.—The provincial lunatic asylum is at Beaufort, near Quebec. There are also lunatic asylums at Montreal, at St. Ferdinand d'Halifax, and at St. Johns, which receive aid from the province, the first two being under the control of the Catholics and the last of the Protestants. Aid is also granted to the Belmont Retreat inebriate asylum in Quebec, to the Catholic and Protestant deaf and dumb institutions in Montreal, to the Nazareth asylum for the blind and for destitute children in Montreal (under the control of the sisters of charity), to the reformatories at Montreal and Sherbrooke (the former Catholic and the latter Protestant), and to various hospitals and asylums conducted by religious bodies. There is a penitentiary at St. Vincent de Paul on Isle Jésus, under the control of the Dominion. The number of convicts at the close of 1873 was 122.—The public schools of the province are under the direction of the minister of public instruction, assisted by a council of 24 members (16 Catholics and 8 Protestants) appointed by the lieutenant governor. For each municipality there

are five commissioners, elected by the rate payers, having the immediate management of primary schools. In municipalities where different religious denominations exist, the minority may select syndics or trustees to direct their own schools; these are called dissentient schools. Inspectors, 32 in number, acting under the immediate direction of the minister of public instruction, are required to visit the schools of their respective districts at least twice a year and report upon their condition. The provincial grant is apportioned among the municipalities, and in each a special tax is levied. Each head of a family is also required to pay a monthly fee, varying from 5 to 40 cents, for every child between 7 and 14 years of age, whether attending school or not. Dissentient schools receive a share of these moneys. The following statistics are for 1873 :

Municipalities, number.....	852
School districts.....	8,870
School houses.....	8,831
Elementary schools.....	8,254
Pupils.....	141,990
Primary superior schools for boys.....	269
Pupils.....	21,653
Primary superior schools for girls.....	74
Pupils.....	6,930
Protestant dissentient schools.....	186
Pupils.....	6,156
Catholic dissentient schools.....	84
Pupils.....	1,509
Academies.....	83
Pupils.....	8,252
Colleges.....	87
Pupils.....	7,113
Normal schools.....	4
Pupils.....	246
Educational convents.....	129
Pupils.....	24,236
Independent schools.....	156
Pupils.....	6,261
Total educational institutions.....	4,226
" pupils.....	224,851
Male teachers.....	999
Female teachers.....	4,017
Provincial grant, amount.....	\$155,000 00
Local assessments, regular and special.....	\$456,194 40
Monthly fees.....	\$715,661 76
Total amount available.....	\$1,326,856 16
Public libraries, number.....	206
Volumes.....	108,512

Only the municipal or parochial libraries are given in the table. The schools for the training of teachers are the Laval normal school at Quebec, and the Jacques Cartier and McGill normal schools at Montreal. There are three universities: Laval university at Quebec (Roman Catholic), McGill university at Montreal (Protestant, but not denominational), and the university of Bishop's college at Lennoxville (Episcopal). The first, with its affiliated institutions in various parts of the province, is treated in the article on the city of Quebec. McGill university was founded by a bequest of the Hon. James McGill in 1811, was incorporated by royal charter in 1821, and re-organized by an amended charter in 1852. In immediate connection with it are the McGill normal and model schools and McGill college. The college has a faculty of arts, with a department of applied science, and faculties of medicine and law. The department of arts has a museum and a library of 16,330 volumes,

and the medical department a museum and a library of 4,000 volumes. St. Francis college, at Richmond, and Morrin college, at Quebec, are affiliated with the university, the former in respect of degrees in arts and the latter in arts and law. There are two affiliated theological colleges, the Congregational college of British North America, at Montreal, and the Presbyterian college of Montreal, the students in which have the privilege of pursuing the course of study in arts. The university receives a small annual grant from the province. Morrin college was founded in 1860 and incorporated in 1861. It has a faculty of divinity in connection with the church of Scotland. The university of Bishop's college was incorporated by royal charter in 1852. It comprises faculties of divinity, arts, and medicine, the last being at Montreal. Bishop's college, founded in 1843, and Bishop's college school, in 1857, are in immediate connection with it. The college has a museum and a library of 5,000 volumes. There is a medical school (*école de médecine et de chirurgie*) at Montreal affiliated with Victoria university, Cobourg, Ontario. There are 12 or 15 classical colleges besides those already named, and about the same number of industrial colleges. The number of newspapers and periodicals published in the province in 1875 was 72 (43 English and 29 French), issuing 90 editions, viz.: 14 daily, 10 tri-weekly, 3 semi-weekly, 40 weekly, 1 semi-monthly, 19 monthly, and 3 quarterly.—The following table contains the statistics of the principal religious denominations, according to the census of 1871 :

DENOMINATIONS.	Churches.	Buildings attached.	Adherents.
Baptist.....	82	44	8,686
Episcopal.....	176	908	62,449
Methodist.....	181	138	34,100
Presbyterian.....	94	154	46,165
Roman Catholic.....	610	2,097	1,019,850
Other.....	28	40	20,266
Total.....	1,071	2,831	1,191,516

Of the Baptists 3,378 were Freewill Baptists, and of the Methodists 26,737 were Wesleyans. Among denominations not named in the table were 5,240 Congregationalists, 3,150 Adventists, 1,937 Universalists, and 1,093 Unitarians. —Jacques Cartier took possession of this region in the name of the French king in 1534. The first permanent settlement was effected at the city of Quebec in 1608. Montreal was settled in 1642. The French ceded the territory, together with what is now Ontario, to Great Britain in 1763, and in 1774 the whole was organized as the province of Quebec. In 1791 it was divided into two provinces, Lower Canada and Upper Canada, and in 1841 these were reunited as the province of Canada. Upon the organization of the Dominion of Canada in 1867, they were again separated, and Lower Canada became the province of

Quebec. An elective assembly was granted to the provinces in 1791, and in 1841 responsible government was introduced. For further historical details, see CANADA, DOMINION OF.

QUEBEC, a county of the province of Quebec, Canada, on the N. bank of the St. Lawrence, including territorially, though not politically, the city of Quebec; area, 2,598 sq. m.; pop. in 1871, 19,607, of whom 14,681 were of French, 3,321 of Irish, 772 of English, and 547 of Scotch origin or descent. It is watered by the Batiscan, St. Anne, and St. Charles rivers, and other streams. Capital, Charlesbourg.

QUEBEC, a fortified city and port of entry of the Dominion of Canada, capital of the province of Quebec, situated on the N. W. bank of the river St. Lawrence, at its confluence with the St. Charles, nearly 400 m. from the gulf of St. Lawrence, and 140 m. (in a direct line) N. E. of Montreal, in lat. $46^{\circ} 49' 6''$ N., lon. $71^{\circ} 13' 45''$ W.; pop. in 1861, 59,990; in 1871,

59,699 (the decrease being attributed to the withdrawal of the British regiments forming the garrison). Of the latter number, 40,890 were of French, 12,345 of Irish, 3,974 of English, and 1,861 of Scotch origin, and 52,357 were Roman Catholics. Quebec is built on the northern extremity of an elevated tongue of land which forms the left bank of the St. Lawrence for several miles. Cape Diamond, so called from the numerous quartz crystals formerly found there, is the loftiest part of the headland, 333 ft. above the stream, and crowned with the vast fortifications of the citadel. These occupy about 40 acres, and with their outlying works obtained for Quebec the appellation of the "Gibraltar of America." From the citadel a line of wall runs westward toward the cliffs overhanging the valley of the St. Charles, and is thence continued around the brow of the promontory till it connects once more with Cape Dia-



Quebec, from Point Lévi

mond near the governor's garden. This circuit is about $2\frac{3}{4}$ m. in extent, and is pierced by five gates, now dismantled. The walls and ramparts outside of the citadel proper, though still mounted with cannon, are no longer kept in repair. The modern changes in artillery have necessitated the construction at enormous cost of a vast system of defensive works on the heights beyond Point Lévi, and others are contemplated. Cape Diamond, Durham terrace, the grand battery, and the vast balcony on the university building, on the east and north, and the ramparts between St. Louis and St. John gates, on the south and west, afford prospects rivalled by few in America. The city is divided into the upper and the lower town. The former comprises the walled city with the two suburbs of St. Louis and St. John, between the walls and the plains of Abraham. The lower town is the portion which encircles

the base of the promontory from beneath Cape Diamond to the mouth of the St. Charles, together with the suburbs of St. Roch, St. Sauveur, and Boisseauville. A very large part of the city within the walls, or the upper town proper, is taken up with the buildings and grounds of great religious corporations, the seminary and Laval university, the Ursulines and the Hôtel-Dieu, and the ancient Jesuit college, founded in 1633, and occupied as a barrack after 1812. It is now proposed (1875) to erect a building for the provincial legislature on its site. Over the remaining irregular surface, not covered by military works, are crowded the quaint mediæval streets and dwellings, built generally of stone, two or three stories high, and roofed, like the public buildings, with shining tin. Here are situated the parliament house, post office, court house, city hall, the residences of the officers of the

provincial government and of the wealthy capitalists, the principal hotels, finest stores, and chief places of amusement. The suburbs of St. Louis and St. John extend southward and westward along the plateau; the former along the foot of the citadel to that part of the



Wolfe's Monument.

plains of Abraham where Wolfe conquered, and where a modest column stands with the inscription: "Here Wolfe died victorious, Sept. 13, 1759;" the latter lower down on the slope, skirting the verge of the acclivity. A handsome iron column, surmounted by a bronze statue of Bellona, in memory of the victory of the chevalier de Lévis over Gen. Murray in 1760, was erected here in 1854, the statue being presented by Prince Napoleon Bonaparte. These suburbs, which are constantly encroaching on the historic plains, contain many beautiful private residences, and several large conventual establishments and churches.—The lower town proper was the most ancient part of Quebec, surrounding the old church of Notre Dame des Victoires on the east, built on the site of Champlain's residence, and comprising chiefly what is now the Champlain ward. It communicates with the upper town by the Champlain steps and the steep and winding Côte de la Montagne or Mountain street. Here, around Notre Dame des Victoires and the Champlain market, are the principal wharves and steamboat and ferry landings. It is the busiest and most crowded mart of the city, and a conglomeration of irregular streets. St. Peter street leads northward from this quarter to the custom house, on the very apex of the beach formed by the confluent waters. Here, beneath the guns of the grand battery 200 ft. above, are the great commercial establishments, the merchants' exchange, the banking houses, whole-

sale stores, and bonded warehouses. St. Paul's street connects with St. Peter's before the custom house, and stretches westward on the narrow strand between the cliff and the bay, amid breweries, distilleries, manufactories, and gas works, till it meets, near the mouth of the St. Charles, St. Joseph street, the main artery of the large suburb St. Roch. On the banks of the St. Charles are the principal ship yards. St. Roch and Boisseauville are the home of the laboring classes. The chief institutions here are the large convent and schools of the sisters of Notre Dame near the church of St. Roch, and the general hospital on the banks of the St. Charles.—From Près-de-ville, at the foot of Cape Diamond, proceeding S. W. as far as Sillery, the shore of the St. Lawrence is indented with 17 coves, all filled with lumber rafts. The opposite shore of the St. Lawrence, from New Liverpool to and beyond Point Lévi, presents a scene of activity scarcely surpassed by the city itself. New Liverpool is connected with Quebec by a steam ferry, has several factories and mills, a large trade in lumber, and the church of St. Romuald, the finest on the lower St. Lawrence. Adjoining New Liverpool is South Quebec, with a population of 3,000 (increasing rapidly), and immense lumber yards from which large yearly shipments are made. It is the stopping place of the transatlantic steamers from Liverpool. St. Joseph, between South Quebec and Lévis, has as large a business as the former. The town of Lévis or Point Lévi, situated on the right bank opposite the island of Orleans, just where the main branch of the St. Lawrence turns eastward, is the terminus of the Grand Trunk railway and of the Lévis and Kennebec railway. It has several churches, a thriving college, a succursal of the seminary of Quebec, a convent with a large female academy, several other flourishing schools, hotels, telegraph offices, extensive lumber and ship yards, and a considerable trade.—Quebec has many fine buildings. The custom house, on the bank of the river, is an imposing Doric edifice with a dome and a façade of noble columns, approached by a long flight of steps. Of the church edifices, the cathedral of Notre Dame is the most remarkable. It was elevated in October, 1874, to the rank of a basilica, on the occasion of the second centenary of the erection of the see of Quebec. It is a plain edifice externally, with a cut stone front added to it in 1844, and unpleasantly contrasting with the remainder of the structure. It is 216 ft. long, 180 wide, and about 80 in interior elevation, capable of seating 4,000 persons, with a spacious sanctuary, a richly decorated high altar, and several original paintings of great value. The Protestant cathedral, a plain gray edifice surmounted by a tall spire, stands in the centre of a large square, enclosed with an iron fence. S. E. of it is the parade ground, a central point, adorned with a fine fountain. The garden of the fortress, another fine pro-

menade, has an obelisk erected in 1828 to the memory of Wolfe and Montcalm. The Chalmers church, the Wesleyan church (in the flamboyant style), and the chapel of the gray sisters are good specimens of Gothic church architecture. The marine hospital, built after the model of the temple of the Muses on the banks of the Ilissus, the archbishop's palace, the parliament buildings, the theatre, the city hall, and the university buildings are worthy of notice.—The St. Lawrence is about three quarters of a mile (1,314 yards) wide opposite Cape Diamond, but the mouth of the St. Charles forms with it a magnificent basin nearly 4 m. long and 3 m. wide. The beautiful island of Orleans and the shores of Point Levi shut in this basin on the northeast and east. The depth of the water is about 28 fathoms. The ordinary tide is 17 or 18 ft. at new and full moon; but the spring tides attain a height of 23 or 24 ft. The harbor is safe and commodious, and the largest vessels can lie at the wharves. In the latter part of December the river is closed by ice, and navigation ceases till the latter part of April, when the ice usually disappears very suddenly. There are two regular lines of transatlantic steamers, running weekly between Quebec, Liverpool, and Glasgow, and one fortnightly line between Quebec and London. There are also weekly steamers for the gulf ports, steamers for the Saguenay almost daily in the summer months, and semi-weekly for the stations intermediate between Quebec and Three Rivers, besides several ferries.—Quebec, next to Montreal, is the most important centre of maritime commerce in British North America. It is one of the largest lumber and timber markets on the American continent. The principal imports are woollen, cotton, and silk goods, iron, hardware, coal, and salt. The exports consist chiefly of ships, lumber, and grain. The ships built at Quebec are renowned for their beauty, solidity, and sailing qualities. Much the larger portion of the commerce is with Great Britain. The value of imports in 1860 was \$3,358,676; of exports, \$7,271,959. The value of imports and exports for the four years ending June 30, 1874, was as follows:

YEARS.	Imports.	Exports.
1871.....	\$6,277,370	\$12,688,904
1872.....	7,582,221	11,931,077
1873.....	6,546,976	12,587,276
1874.....	7,422,063	12,746,305

The number of entrances during the last named year was 983, tonnage 790,361, of which 533, tonnage 381,032, were in ballast; of clearances, 846, tonnage 671,386; number of vessels built, 52, tonnage 21,065. The number of vessels belonging to the port on June 1, 1874, was 801, with an aggregate tonnage of 100,564. According to the census of 1871, the amount of capital invested in manufactures was \$2,870,638; number of hands employed, 7,250; amount

of yearly wages, \$1,459,279; value of raw materials, \$4,771,459; total value of products, \$8,449,752. The principal articles of manufacture are boots and shoes, saw-mill products, ships, bakery products, furniture, foundry products and machinery, refined sugar, India-rubber goods, rope and twine, clothing, cooperage, carriages, ale and beer, furs and hats, sash, doors, and blinds, soap and candles, and tobacco. There are three banks with an aggregate paid-up capital on Sept. 30, 1874, of \$6,807,205; circulation, \$3,044,719; deposits, \$8,614,438; specie and Dominion notes, \$1,623,750; discount, \$14,603,747.—Quebec returns three members to the Dominion house of commons, and three to the provincial legislature. It is divided into eight wards, and is governed by a mayor, eight aldermen, and 18 councillors. It is the seat of a Protestant bishop and a Roman Catholic archbishop, and has 19 churches and a synagogue. The chief benevolent institutions are: the Hôtel-Dieu, with its convent and hospital, founded in 1639 by the duchess d'Aiguillon, and in 1875 comprising 45 sisters of the Sacred Blood of Dieppe, 80 beds for patients of every creed and nationality, and ministering gratuitously to 10,000 patients yearly; the general hospital, with convent and halls for incurable patients, founded at a personal expense of 100,000 crowns by Bishop de Saint-Valier in 1693; the hospital of the Sacred Heart of Jesus, a branch of the general hospital, opened Sept. 8, 1873; the convent of the sisters of charity, or gray sisters, founded in 1848 by Archbishop Turgeon, combining an asylum for the aged and infirm poor, an orphanage, and a free industrial school for 1,000 pupils, the whole supported by private industry and charity; the house of the Good Shepherd, a reformatory for the fallen, a conservatory for exposed girls, and a school for 500 pupils, established in 1850, supported during the first year by the guild of St. Vincent de Paul, and at present almost entirely self-supporting with the aid of private charity. Connected with the medical school of the Laval university are the maternity hospital and the dispensary, the former founded in 1852 by the Rev. Joseph Auclair, aided by Mlle. Méthivier, a poor seamstress (who has also opened a private lying-in asylum, now governed by herself); the latter established in February, 1866, also by Father Auclair and the seminary of Quebec, and exclusively supported by them with the aid of private charity, and a grant of \$500 from the legislature toward the hospital. Both afford assistance to all applicants without exception. The maternity hospital is under the charge of the sisters of the Good Shepherd, and the dispensary under that of the sisters of charity. There are also the St. Bridget's asylum, connected with St. Patrick's Roman Catholic church, and the ladies' Protestant home, the latter providing for old men and young unprotected girls. The marine hospital, on the bank of the St. Charles, near the general hospital,

and the Canada military asylum for the widows and orphans of British soldiers, are maintained at the public expense.—The most important educational institution is the "Seminary of Quebec," with its offshoot and dependent the Laval university. The seminary was founded in 1663 by François de Montmorency-Laval, first bishop of Quebec, who bestowed upon it at his death in 1708 all the personal property in Canada which he had purchased by the sale of his patrimonial estates in France. The *grand séminaire* or theological school was opened in 1666, and the *petit séminaire* or collegiate school in 1668. The first building for the special use of these schools, of stone, on the site of the present middle seminary building, was erected in 1678; it was burned in 1701, rebuilt, and again burned in 1705, when it was built larger. It was originally designed only for clerical students; but when the Jesuit college, founded in 1637, was closed after the conquest, the seminary courses were thrown open to all classes. The whole community of professors and pupils numbered 54 persons in 1704, and 110 in 1800. Within the present century two new wings have been added to the original building, each far exceeding it in size and costliness. The institution was raised to the rank of a university by a charter signed by Queen Victoria Dec. 8, 1852, the power of conferring the canonical degrees in theology being granted by Pius IX., March 6, 1853. The corner stone of the principal university building was laid Sept. 20, 1854. The three buildings erected are 576 ft. long (the main building being 286 ft.), five stories high, and of cut stone; the whole has been completed at a cost of \$238,787, without counting the sums expended for museums, library, apparatus, and picture gallery, amounting to about \$500,000. In 1865 the whole of the new wing of the theological seminary and a portion of the old were burned down; but the directors rebuilt and enlarged these portions, giving a total length of 684 ft. for the seminary buildings alone. The buildings connected with the main university edifice are a separate school of medicine and a boarders' hall for students in law and medicine. In thus founding the university and providing it with all that was needful, the directors declined all aid from the government or the city. The large hall of convocation has seats for 1,200 persons, besides galleries for ladies; the chemical laboratory is spacious, fire-proof, and provided with complete apparatus. The mineralogical and geological collections were first prepared under the direction of the Rev. John Holmes, and afterward, with several large subsequent additions, arranged systematically by Prof. T. Sterry Hunt. The museum of botany is equally complete. That of zoölogy contains upward of 1,300 different birds and over 7,000 insects. The ethnological collection is chiefly made up of the remains of Canadian Indians, and is mainly due to the labors of Dr. J. C. Taché. The museum of the medical de-

partment is especially complete. The gallery of paintings, lately thrown open to the public, contains 150 originals, duplicates, and copies, sent from France after the revolution of 1791, and repurchased from various owners in Canada, by the Hon. Joseph Légaré. The university library contains upward of 55,000 volumes, independently of the libraries belonging to the theological and preparatory departments, amounting to about 20,000 volumes more. The nine directors of the seminary are by right members of the university council, the superior of the seminary being *ex officio* rector of the university. The other members of the council are the three senior professors in each of the faculties of divinity, law, medicine, and arts. The Roman Catholic archbishop of Quebec is *ex officio* visitor of the university; to him belongs the appointment of the professors of divinity and canon law, and the conferring of all degrees in the same. In 1875 there were five titular professors in divinity and its kindred sciences, six in law, nine in medicine, and five titular and six associate professors in arts, and one honorary professor and three tutors or professors *chargés de cours*. The divinity course embraces four years, the law course three years, and the medical course four years. There are six affiliated colleges: the college or preparatory seminary of Quebec, the college of Nicolet, the college of Ste. Anne de la Pocatière, the college of Ste. Thérèse de Blainville, the college of St. Joseph, Three Rivers, and that of St. Germain, Rimouski. The affiliated theological seminaries are those of Quebec, Ste. Anne de la Pocatière, and St. Germain de Rimouski. About 40 priests and theological students are employed in various capacities: of these the board of directors, or the corporation of the seminary, receive no salary, being provided with all necessities at an annual expense of about \$250 for each. The auxiliary priests receive, besides their board, a salary of \$100; the tutors or disciplinarians who are theological students have each a yearly salary of \$55; and the whole amount of salaries is considerably less than \$2,000. In 1874 there were in all 290 university students, of whom 55 were in the divinity school, 36 in the law school, 93 in the medical school, and 106 in the junior and senior classes of philosophy.—Besides the university, Quebec has the Laval normal and model school, founded in January, 1857, under the superintendence of the Hon. Pierre J. O. Chauveau; the Morrin college, the only non-episcopal Protestant one in the province; and the Quebec high school. Morrin college occupies the old prison in the centre of the upper town; it has 10 professors, but is inadequately patronized. The high school has been always very successful, and has 200 students, with a large staff of professors and a handsome library. The other principal schools are: the Ursuline convent, founded in 1639, having in 1875 89 nuns, and educating 260 boarders, 140

half boarders, and 400 day scholars, together with 55 pupil teachers and 200 pupils belonging to the female department of the Laval normal school; the congregation of Notre Dame, with their chief convent and school near St. Roch's church, established in 1843 by the Rev. Z. Charest, and having two schools in the city with 2,100 pupils in 1875, most of whom are educated without cost to the parents; and the "Brothers of the Christian Schools," founded in 1842 by the late Archbishop Baillargeon, with three residences and six schools and a commercial academy founded by the Rev. Joseph Auclair, educating gratuitously 2,500 pupils, and receiving in return the bare necessities of life from the free bounty of the citizens. There are several flourishing literary societies, foremost among which is the Quebec literary and historical society, the oldest chartered institution of the kind in Canada, founded in 1824. It still has a valuable library, though a great portion of its most precious books and manuscripts were destroyed with the parliament buildings in 1854. The Canadian institute, the entomological society, and the St. Patrick's literary institute possess valuable libraries, as well as the society of advocates, the board of trade, and the merchants' exchange. There are five daily newspapers (three of which are in the French language), one tri-weekly, four weekly, and three monthly periodicals.—The site of Quebec was visited by Cartier in 1534-'5, and the city was founded by Champlain in 1608. It was taken by the English in 1629, and restored to France by the treaty of 1632. In 1636 it had 100 inhabitants. It was the colony of a concessionary company, who did not fulfil their promises to the settlers, and hence its growth was slow. The magistrate, named by the company, was called a syndic, and had powers similar to those of a mayor. The king, dissatisfied with the management of the company, took the colony into his own hands, and in 1663 appointed a governor and created the sovereign council of Quebec, who were charged with its government. In 1690 the neighboring English colonies made an unsuccessful maritime expedition against it. In 1711 the attempt was renewed, with no better success. The first attempt at erecting stone fortifications was made after the first of these attacks, the place having been previously protected only by palisades. In 1734 it had, including its suburbs, only 4,603 inhabitants. In 1759, during the seven years' war, the English Gen. James Wolfe attacked the city and bombarded it. On Sept. 13 took place the first battle of the plains of Abraham, in which both the contending generals fell, and England gained at one blow an American empire. On Sept. 18 Quebec capitulated after a siege of 69 days. The French attempted its recapture, and in the following spring the second battle of the plains of Abraham was fought, and victory sided with the French colonists; but at the treaty of peace in 1763

Louis XV. ceded the whole of New France to the English. Quebec, ruined by Wolfe's bombardment, rose slowly from its ashes, though its commerce increased. In 1764 the first newspaper, the "Quebec Gazette," published in two languages, made its appearance. In 1775 the city had only 5,000 inhabitants. In December, 1775, a small American force under Gen. Montgomery attempted its capture, but failed, with the loss of about 700 men and their commander (Dec. 31). In 1792, the year after the inauguration of the representative system in Canada, the first Lower Canadian parliament was convoked at Quebec, and the city remained the seat of government for the lower province till the union of the Canadas in 1841. During this period its growth was steady and moderately rapid; in 1844 its population was 32,876, besides 2,797 in the suburbs. Two terrible fires occurred in 1845, at a month's interval, in the faubourgs of St. Roch and St. John; nearly 3,000 houses were burned, and property to the amount of more than \$8,000,000 was destroyed. Large conflagrations also occurred in 1862 and 1866; and great improvements have since been made in the fire department and a more secure style of building adopted. In 1851 Quebec again became the capital for four years under the arrangement for alternating capitals adopted in 1849, and kept up till 1858, when Ottawa became the seat of government. After the erection of the Dominion of Canada in 1867, Quebec became the capital of the province of Quebec.

QUEDLINBURG, a town of Prussia, in the province of Saxony, beautifully situated near the lower Hartz mountains, on the Bode, a tributary of the Saale, 31 m. S. W. of Magdeburg; pop. in 1871, 16,402. Two arms of the Bode divide the old from the new town, and there are four suburbs, one laid out in 1862. The castle, on a rocky eminence, once the residence of the local abbesses, is in decay, and is partly used as a school. The Schlosskirche, with remarkable art treasures, was made in 1838 the theme of a special work by Ranke and Kugler. There are seven Protestant churches, and one Catholic. A gymnasium was established here by Luther and Melancthon. The ruined convent of St. Wipertus is now a barn. In the Brühl garden are monuments of Klopstock and Carl Ritter, who were born here. Quedlinburg is a market for seeds, agricultural and garden products, cattle, books, and woollen goods. The see of Quedlinburg was celebrated from the 10th to the 18th century for its abbesses, who had a seat in the diet as princesses of the German empire. The first abbess was Matilda, daughter of Otho I. (968-999). In 1539 the abbesses joined the reformation. Conspicuous among those of the 18th century were Anne Amalia, a sister of Frederick the Great, and Sophia Albertina, a daughter of King Adolphus Frederick of Sweden, who was the last, retiring in 1802, but retaining the title till her death.

QUEEN (Goth. *queins*, *quens*, a woman, a wife; Icelandic, *krán*; A. S. *cwén*, wife, queen; Gr. *γυνή*, a woman), the wife of a king, or a woman who is the sovereign of a kingdom. In the former capacity she is regarded in most countries as a person of dignity only inferior to that of her husband, and possesses all the privileges enjoyed by a *feme sole*. Thus in England she can receive grants from or make them to her husband, can purchase or convey land without his concurrence, can sue and be sued alone, and dispose of her property by will. She has a separate household and separate courts and officers, is exempted from paying tolls and amercements, and has other extraordinary privileges; and to compass or imagine her death, or to violate or defile her person, even with her consent, is treason. If accused of treason herself, she is tried by the peers of parliament. She is also entitled to be crowned with full regal solemnities. In other respects she is on a footing of equality with the subjects of her husband, in accordance with the maxim of the Roman law: *Augusta legibus soluta non est*. As a sovereign princess, a signification not originally comprehended in the term queen, she possesses all the attributes of a king; and her husband, if she is married, is her subject. In France, where by the Salic law a female could not succeed to the throne, the mother of a sovereign sometimes exercised royal authority during the minority of her son, in which case she was called the queen regent. The queen dowager is the widow of a king, and as such enjoys most of the privileges accorded to her during the lifetime of her husband. In England she does not lose her rank, although she marry with a commoner; but no one can contract a marriage with her without a special license from the sovereign. When the queen dowager is mother of the sovereign, she is commonly called the queen mother.

QUEEN ANNE, an E. county of Maryland, bordered E. by Delaware, W. by Chesapeake bay, and N. W. by Chester river, and drained by several creeks; area, 400 sq. m.; pop. in 1870, 16,171, of whom 6,592 were colored. It has a rolling surface and fertile soil. The chief productions in 1870 were 326,828 bushels of wheat, 605,975 of Indian corn, 59,167 of oats, 26,845 of Irish and 9,467 of sweet potatoes, 22,581 lbs. of wool, and 107,422 of butter. There were 3,703 horses, 586 mules and asses, 3,121 milch cows, 1,201 working oxen, 3,050 other cattle, 5,373 sheep, and 9,942 swine; 1 fruit-canning establishment, 1 woollen mill, and 3 saw mills. Capital, Centreville.

QUEEN CHARLOTTE ISLANDS, a group in the N. Pacific ocean, about 130 m. N. W. of Vancouver island, and about 80 m. from the coast of British Columbia, to which they belong. They consist of four principal islands, with numerous adjacent islets, extending N. N. W. and S. S. E. about 180 m., and separated by narrow channels; aggregate area about 5,000

sq. m. The largest islands are Prevost at the southern extremity of the group, Moresby, Graham, and North at the northern. Moresby island is about 80 m. long and from 10 to 30 m. wide, with an area of 1,500 sq. m. Graham island is about 80 m. long and from 20 to 60 m. wide, with an area of 3,000 sq. m. Prevost and North islands are much smaller. The surface is hilly, but not mountainous. The interior is clothed with magnificent forests of pine, cedar, and similar trees. Copper and iron ores and anthracite coal have been found. Various kinds of berries are abundant, and potatoes are cultivated by the natives. There is thought to be much arable land. The climate is equable, the winters being mild and the summers cool. The harbors are numerous. The surrounding waters swarm with fish. The natives, divided into several tribes, number 4,000 or 5,000.

QUEEN CHARLOTTE SOUND. See VANCOUVER ISLAND.

QUEENS, a S. E. county of New York, in the W. part of Long Island, bordered N. by Long Island sound and S. by the Atlantic ocean; area, 410 sq. m.; pop. in 1870, 73,803. Its surface is somewhat hilly; much of the soil is fertile, and nearly all is highly cultivated. The shores are much indented by bays and inlets, and on the S. beach are many small islands. It is intersected by the Long Island and several other railroads. The chief productions in 1870 were 83,258 bushels of wheat, 58,576 of rye, 535,796 of Indian corn, 164,599 of oats, 7,063 of barley, 24,685 of buckwheat, 49,145 of peas and beans, 734,549 of potatoes, 48,325 tons of hay, 11,254 lbs. of wool, and 362,250 of butter. There were 7,733 horses, 8,627 milch cows, 569 working oxen, 2,294 other cattle, 3,838 sheep, and 8,229 swine; 4 manufactories of brick, 28 of carriages and wagons, 7 of cordage and twine, two of explosives and fire-works, 1 of fertilizers, 1 of India-rubber and elastic goods, 3 of liquors, 4 of machinery, 8 of brick and stone, 4 of oil, 5 of paper, 11 of saddlery and harness, 4 of sash, doors, and blinds, 2 of starch, 3 of stone and earthen ware, 14 of tin, copper, and sheet-iron, 4 flour mills, 5 lumber mills, and 4 ship yards. The court house is in the town of North Hempstead, about a mile from Mineola station on the Long Island railroad. The county clerk's office is in the village of Jamaica. A new court house is in course of erection in Long Island City.

QUEEN'S. I. A S. central county of New Brunswick, Canada, intersected by the St. John river; area, 1,480 sq. m.; pop. in 1871, 13,847, of whom 5,469 were of Irish, 4,842 of English, 2,142 of Scotch, and 918 of Dutch origin or descent. Around Grand lake considerable quantities of bituminous coal are mined. The county is traversed by the European and North American railway. Capital, Gaagetown.

II. A S. W. county of Nova Scotia, Canada, bordering on the Atlantic ocean; area, 1,065 sq. m.; pop. in 1871, 10,554, of whom 5,270

were of English, 2,245 of German, 1,150 of Scotch, and 1,110 of Irish origin or descent. The coast is deeply indented, and bordered by a rugged ridge extending many miles inland. The interior is beautifully diversified with valleys, rivers, and lakes. The soil along the streams is fertile. Capital, Liverpool. **III.** The central county of Prince Edward Island, Canada; area, 771 sq. m.; pop. in 1871, 42,651. It is traversed by the Prince Edward Island railway. The surface is diversified and the soil fertile. Capital, Charlottetown, which is also the capital of the province.

QUEEN'S, a S. E. county of Ireland, in the province of Leinster; area, 664 sq. m.; pop. in 1871, 77,071. The Slieve-Bloom mountains divide it from King's county. The principal rivers are the Barrow and its tributary the Nore. Lough Annagh, on the N. boundary, the only lake of any importance, is not more than a mile long. Iron and copper ore and potter's clay are found; and anthracite coal mines are worked. Excepting in the centre of the county, where there are extensive bogs, the soil is generally fertile. The principal towns are Mountmellick, Mountrath, and Maryborough.

QUEENSLAND, a British colony in Australia, comprising the N. E. part of the island, lying between lat. 10° 43' and 29° S., and lon. 138° and 153° E., bounded N. by Torres strait, N. E. by the Coral sea, E. by the South Pacific, S. by New South Wales and South Australia, W. by South Australia and the Northern Territory, and N. W. by the gulf of Carpentaria; area, including the coast islands, 678,000 sq. m.; pop. in 1871 (revised), 120,104; in 1873, estimated at 146,690. Of the population in 1871, 71,767 were males and 48,337 females; 47,343 were born in Australia and New Zealand, 26,296 in England and Wales, 8,564 in Scotland, 20,972 in Ireland, 8,317 in Germany, 3,305 in China, 215 in the United States, and 188 in France. The religious division of the inhabitants in 1871 was as follows: Anglicans, 43,764; Roman Catholics, 31,822; Presbyterians, 15,373; Wesleyans, 7,206; Congregationalists, 2,647; other Protestant denominations, 11,485; Jews, 291. No trustworthy information can be obtained concerning the number of aborigines.—The coast line, from Point Danger, the S. E. extremity, to Cape York, the most northerly point, has a general N. W. direction; it runs thence nearly due S. to the southernmost part of the gulf of Carpentaria, forming the York peninsula, when it turns W. and then nearly N. W. to the boundary line of the Northern Territory. Its entire length is about 2,500 m. Off the E. coast, at an average distance of 20 to 30 m. from the shore, though in some places 60 m., lies the coral reef called the Great Barrier, which extends from Cape York to lat. 24°, about 1,250 m. Within this reef, through which there are frequent though dangerous passages, is a navigable sea, with an ordinary depth of 10 to 25 fathoms;

but at the S. end, where the channel is widest, the depth exceeds 60 fathoms. The coast, both within this sea and S. of it, is indented by numerous fine bays, with capacious natural harbors, many of which form the outlets of navigable rivers. The principal of these are Moreton bay, at the head of which stands Brisbane, the capital of the colony, Hervey bay, Port Curtis, Keppel bay, Port Bowen, Port Denison, and Halifax, Rockingham, Trinity, Princess Charlotte, Weymouth, and Shelburne bays. The whole E. coast is strewn with islands, chiefly small. The largest, Frazer or Great Sandy island, in lat. 25°, is about 80 m. long by 20 m. wide. In Torres strait are Mulgrave's, Banks, and Prince of Wales islands, and in Carpentaria bay is a group called the Wellesley islands, the largest of which is Mornington. Along the gulf of Carpentaria the coast is low and sandy, with the exception of the S. part, where mountain ranges approach the sea. The E. coast is generally mountainous. From 50 to 100 m. from the shore, and parallel to it, is a mountain chain forming several distinct ranges, from which numerous spurs run to the sea. The principal of these are the Gilbert range in the north, the Expedition range in the middle, and the Denham range in the south. The general height of the mountains is not more than 2,000 ft., but some of the peaks are much higher. Mt. Mitchell, S. of Brisbane, is 4,120 ft. high; Mt. Eliot, near Halifax bay, 4,122 ft.; and two of the peaks of the Bellen-den Kerr range, on the coast S. of Trinity bay, are respectively 5,158 ft. and 5,438 ft. high. Beyond the mountains, table lands covered with herbage and well supplied with water, but without trees, stretch across the country to the gulf of Carpentaria, broken occasionally by mountain ranges. Within certain distances of the principal mountains the rains fall regularly, and the plains are covered with light timber. The mountains themselves are heavily wooded. Queensland is drained by many rivers, several of which are navigable. In the S. part most of the streams flow into New South Wales. The chief rivers that find an outlet on the E. coast are the Brisbane, which, together with the Arrowsmith, Logan, Pine, and Caboolture, empties into Moreton bay, and it is navigable for 75 m. by steamers; the Mary and the Burnett, which flow into Hervey bay; the Fitzroy, which, with its affluents, the Dawson, Mackenzie, and Isaacs, drains several hundred miles of country, and is navigable for 60 m. above its mouth in Keppel bay; and the Burdekin, which is fed by the Bowen, Belyando, and others, and empties into Wickham bay. The Mitchell, Van Diemen, Flinders, and Albert flow into Carpentaria bay. The banks of the rivers are usually high and well wooded, being mostly covered with thick hedges of mangroves and forests of fig trees and eucalypti, festooned with flowering vines. On the mountains the pine and cedar, and many varieties of trees unknown elsewhere, grow luxu-

riantly.—The climate of Queensland is preferable to that of other parts of Australia, it being said to resemble closely that of Madeira, and the colony has been for many years the resort of invalids from the other settlements. The summer is hot, the thermometer sometimes indicating 100° in the shade; but the atmosphere is dry, and the heat is so tempered by the sea breezes that the nights are always cool. It is generally exempt from the hot winds which prevail in other parts of Australia. Rain falls regularly in the hot season, but a dry season is experienced every six or seven years. Most of the productions of both temperate and tropical countries can be cultivated with success. There are few indigenous fruits or vegetables, but those of almost all other countries have been naturalized. The soil is well adapted for the cultivation of cotton, sugar cane, and tobacco, as well as of maize, wheat, and other cereals, and all the vegetables and flowers of northern Europe. At the end of 1872 there were 62,491 acres under cultivation, of which 12,002 were devoted to cotton and 11,757 to sugar cane. The orange, lemon, citron, pineapple, fig, banana, peach, nectarine, grape, guava, mulberry, apple, pear, granadilla, and many other fruits, grow to perfection. In consequence of the high price of labor and the difficulty of finding a market for agricultural products, the greater part of the industry is devoted to stock raising. The downs furnish rich pasturage, and sheep and cattle increase rapidly. Horses are so numerous that only the best bred animals are selected for breaking. Cattle and sheep are frequently boiled down for their tallow and hides, but attempts have been made of late years to preserve the meat for exportation to Europe. The staple product is wool, the quality of which increases in fineness as the flocks are driven northward. About 195,000 sq. m. are occupied for sheep raising. At the close of 1872 the live stock in the colony numbered 6,687,907 sheep, 1,200,992 horned cattle, 92,798 horses, and 35,732 swine.—Queensland is rich in minerals, principally gold, copper, and coal. Gold was first discovered at Canoona, about 35 m. from Rockhampton. In 1867 several other fields were opened, the richest of which was at Gympie creek, 130 m. from Brisbane, which proved to be very rich in gold-bearing quartz. There are now more than a dozen gold fields in the colony, mostly in the N. and N. W. districts. The total gold product for 1872 was 178,308 oz., valued at £592,993. The richest copper mines are at Clermont, and the chief coal mines are on the Brisbane and Bremer rivers. The product of the coal mines for 1872 was 27,727 tons, valued at £16,120.—Queensland is divided into 12 districts: Moreton, Darling Downs, Burnett, Port Curtis, Maranoa, Leichhardt, Kennedy, Mitchell, Warrego, Gregory, Burke, and Cook. The principal towns, besides Brisbane, are Ipswich, Rockhampton, Gympie, Maryborough, and Toowoomba. The government is vested in a gov-

ernor appointed by the crown, an executive council, and a parliament of two houses, the legislative council and the legislative assembly. The governor is commander-in-chief of the troops, and has also the title of vice admiral. The executive council consists of a colonial secretary, treasurer, postmaster general, attorney general, minister for lands, and minister for mines and public works. The legislative council consists of 21 members, nominated by the crown for life. The house of assembly comprises 32 deputies, elected by ballot for five years. Electors must be natural born or naturalized citizens, 21 years of age, who possess certain small property qualifications, and have suffered no condemnation for criminal acts. Justice is administered through a chief justice, a puisné judge, each of whom has associates, and several district judges. There is no state church, an act having been passed in 1860 abolishing state aid to religion. Nearly all the leading denominations are represented in the colony, and all have numerous places of worship. Education is under the control of a board of education, consisting of six members appointed by the government, with one of the ministry for chairman. It is similar to the national system in vogue in Ireland, and is entirely free. Aid is granted to schools not established by the board, which are called non-vested schools, on their complying with certain regulations. The state also assists schools more advanced than primary schools. In 1870 there were 111 public schools, 226 teachers, and an aggregate attendance of 16,227. Of these, 89 were primary schools, with 170 teachers and 11,087 scholars. Brisbane, Ipswich, and Maryborough have grammar schools. There were also 101 private schools in the colony in 1870. The gross revenue in 1873 was £1,120,034, and the expenditure £948,750. The public debt on Dec. 31, 1872, was £4,547,850. The total value of the imports in 1873 was £2,881,726; exports, £3,542,513. Commercial intercourse is chiefly with the other Australian colonies and with Great Britain. In 1873 the imports from Great Britain amounted to £815,638, and the exports to it to £871,235, of which £534,935 was for wool. The principal articles exported were wool, tallow, gold, copper, tin ore, cotton, live stock, hides, timber, and provisions. The total export of wool in 1872 was 17,793,000 lbs. The entrances at the various ports in 1870 were 476 vessels of the aggregate capacity of 139,292 tons. In the same year 2,825 immigrants were landed. At the close of 1873 there were 218 m. of railway in operation. The chief lines are the Southern and Western, from Ipswich to Warwick, 176 m.; and the Northern, from Rockhampton in the direction of the Dawson river, which in 1873 was completed to Westwood, 30 m. The railways have a gauge of 3 ft. 6 in. At the close of 1872 there were 3,368 m. of telegraph wire in operation, with 53 stations. (For information relating to the geology, zoölogy, botany, and aborigines, see

AUSTRALIA.)—The E. coast of Queensland was discovered by Capt. James Cook, who anchored in Moreton bay in 1770. The country was at first attached to New South Wales, under the name of the Moreton Bay district. In 1823 the Brisbane river was explored by Oxley, the surveyor general of New South Wales, and the site of the city of Brisbane selected for a penal station. In 1825 the first convicts were landed there, and employed in making roads and other public improvements. Convict immigration ceased in 1839, and in 1842 the country was thrown open to free settlers. In 1859, in deference to repeated petitions from the settlers, it was erected into an independent colony.

QUEENSTOWN, a town of county Cork, Ireland, on the S. side of Great island, in the harbor and 7 m. E. S. E. of the city of Cork; pop. in 1871, 10,039. It is built on a steep acclivity, the streets rising one above another parallel to the beach, and the piers forming a fine promenade. A splendid Catholic cathedral is in course of erection (1875). The harbor is 3 m. long by 2 m. broad, with an entrance 2 m. long and 1 m. wide. It contains Spike island with Fort Westmoreland, artillery barracks, and a prison for 800 convicts, who are employed in the fortifications and in constructing a dockyard and basin on the adjoining island of Haulbowline. This island contains a depot for ordnance and victualling stores, and near it is Rocky island, with barracks and powder magazines cut out of the rock. Queenstown is the station of the commanding admiral, of the royal yacht club, and of transatlantic steamers. A vast number of Irish emigrants embark here for the United States, and many passengers land here in preference to Liverpool. Previous to the wars with Napoleon I. it was a small village of fishermen; it then became important as a naval station. It was known as the Cove of Cork until 1849, when the name was changed on occasion of Queen Victoria's visit.

QUEKETT, John Thomas, an English microscopist, born at Langport, Somersetshire, in 1815, died at Pangbourne, Berkshire, Aug. 20, 1861. He entered London hospital as a student in 1831, and became a licentiate of the apothecaries' company and member of the royal college of surgeons. The latter body having established a studentship of human and comparative anatomy, he was unanimously elected to it, and in 1843 was appointed assistant conservator of the Hunterian museum, and on Professor Owen's retirement in 1856 conservator of the museum and professor of histology. He was chosen a fellow of the royal society in 1860. He published "Practical Treatise on the Use of the Microscope" (8vo, 1848; new ed., 1865); "Lectures on Histology" (2 vols. 8vo, 1852-'4); and an "Illustrated Catalogue of Specimens in the College Museum in Lincoln's Inn Fields."

QUELPAERT ISLAND (called by the Japanese Kandozan), an island in the Eastern sea, about

55 m. S. of Corea, and 110 m. W. N. W. of the Goto islands. It is about 45 m. long and 20 m. broad. The soil is volcanic and fertile, good timber abounds, and grazing pastures are extensive. The highest peak reaches an altitude of 6,500 ft. The population is considerable; villages, each under the control of a chief, being numerous. There are no harbors. Corea claims this island, and uses it as a place for exiles and criminals.

QUÉRARD, Joseph Marie, a French bibliographer, born in Rennes, Dec. 25, 1797, died in Paris, Dec. 3, 1865. He was early connected with the publishing business, and from 1819 to 1824 with an establishment in Vienna. He afterward published in Paris *La France littéraire* (10 vols., 1827-'42), followed by *La littérature française contemporaine* (6 vols., 1842-'57), which was prepared by others from the middle of the second volume, owing to his difficulties with the publisher and to his forfeiture of the copyright. Among his other compilations are *Les auteurs déguisés de la littérature française au 19^e siècle* (1845), and *Les supercheries littéraires dévoilées* (5 vols., 1845-'56).

QUERCITRON, a dyestuff, the bark of the black oak, *quercus coccinea*, var. *tinctoria* (*Q. tinctoria* of authors), in some localities called the yellow-barked oak. (See OAK.) The black outer portion of the bark being removed, the inner portion is found to contain a coloring principle which stains the saliva yellow when the bark is chewed; this is extracted by boiling water, giving to it a brownish yellow color, which is deepened by alkalies and brightened by acids. The bark is largely employed in the United States as a dye, and it is also reduced to a coarse powder and shipped to Europe in great quantities for the same use, particularly in calico printing. When this decoction has been deprived of tannin by means of glue, a fine yellow color is obtained upon fabrics mordanted with alum, and various shades of olive with iron mordants. The coloring principle is called quercitrine, or from its acid reaction quercitric acid. Black-oak bark is used for tanning also, but its yellow color makes it objectionable. Its astringent and tonic properties have led to its use in medicine, but white-oak bark, having similar medical properties without the color, is preferred.

QUERÉTARO. I. A central state of Mexico, bounded N. by San Luis Potosí, E. by Hidalgo, S. by Mexico, S. W. by Michoacan, and W. by Guanajuato; area, 3,429 sq. m.; pop. in 1869, 153,286. It occupies a part of the plateau of the Cordillera, and is traversed by numerous mountain spurs, but contains much fertile land. The rivers are all small, and the Rio de Montezuma and Lerma, on the frontiers, are the only streams that deserve notice. Gold, silver, copper, quicksilver, tin, lead, and antimony are found. Grain, tobacco, and the sugar cane are extensively cultivated; cotton is grown in some districts; and considerable numbers

of cattle are reared. The forests abound in fine timber and precious woods. Woollen and cotton goods, earthenware, and saddlery are manufactured, from materials produced mainly within its limits. The state is divided into the districts of Querétaro, San Juan del Rio, Amealco, Jalpan, Toliman, and Cadereyta; the chief towns besides the capital are San Juan del Rio and Toliman. **II.** A city, capital of the state, on a plateau upward of 6,000 ft. above the sea, 110 m. N. W. of Mexico; pop. in 1869, 48,237. It occupies the sides and summits of several hills, and is separated from its suburbs by a small stream. The streets are well laid out, the houses regular, and the city is one of the finest in the republic. The two parish churches are magnificently decorated, and there are 13 other churches. There are a college, a school of art, and an academy of design. The city is supplied with water by an aqueduct 2 m. long, which crosses a plain upon arches, some of which are 90 ft. high, and in connection with a tunnel brings the water a distance of 6 m. The manufactures consist chiefly of woollen and cotton goods, leather, soap, cigars, and pulque. Two miles from the city is the largest cotton mill in the country, employing 2,500 hands. In 1848 the Mexican congress ratified the peace between Mexico and the United States at Querétaro. In February, 1867, the emperor Maximilian having taken refuge in Querétaro, the town was besieged by Gen. Escobedo; on May 15 the emperor was captured, and on June 19 he and his two generals, Miramon and Mejia, were shot, on the Cerro de las Campanas, or hill of the Bells, which overlooks the town.

QUERINI, Girolamo, an Italian scholar, born in Venice, March 30, 1680, died in Brescia, Jan. 6, 1759. He became a Benedictine monk in Florence in 1698, assuming the name of Angelo Maria. In 1700 he came under the influence of Montfaucon; and after lecturing for some time in his convent on Hebrew and Biblical literature, he spent several years visiting the principal libraries of Europe, and returned to Florence in 1714. He was enjoined by the general chapter of his order to write a history of the Italian Benedictines, but was prevented after years of laborious research by Pope Clement XI., and published only a plan of his work with the title *De Monastica Italia Historia Conscribenda* (4to, Rome, 1717). The pope appointed him abbot of the Benedictine monastery in Florence. He was consecrated bishop of Corfu in 1723, and in 1727 bishop of Brescia and cardinal. He left Latin works on history, biography, and mathematics.

QUESADA. See XIMENES DE QUESADA.

QUESNAY, François, a French economist, born at Mérey, near Versailles, June 4, 1694, died in Versailles, Dec. 16, 1774. He began life as a surgeon, and in 1737 became perpetual secretary of the surgical academy; but in 1744 he obtained a diploma as a physician. He was a favorite medical attendant of the royal family and of

Mme. de Pompadour, and occupied rooms next to hers in the palace at Versailles. He published many works on medicine and surgery, which are now obsolete; and he is chiefly remembered as the father of the agricultural system of economy, called by him physiocracy. (See POLITICAL ECONOMY.) His *Tableau économique* (1758) was called by Laharpe "the Koran of economists." His economical works were edited by Dupont de Nemours, under the title *Physiocratie, ou Constitution naturelle du gouvernement le plus avantageux au genre humain* (Paris and Leyden, 1768; reprinted in the *Collection des principaux économistes*, Paris, 1846).

QUESNEL, Pasquier, a French theologian, born in Paris, July 14, 1634, died in Amsterdam, Dec. 2, 1719. He studied in the Sorbonne, became a member of the French congregation of the Oratory in 1657, and was appointed superior of the house of his order in Paris. Having imbibed the doctrines of the Port Royal theologians, he began to publish them in a series of moral commentaries on the gospel for the use of young Oratorians. The first volume appeared in 1671, entitled *Réflexions morales sur le Nouveau Testament*. He next published an edition of St. Leo the Great (4 vols. 4to, 1672), containing notes and commentaries favorable to Jansenism, followed by a commentary on the Acts of the Apostles and the Epistles, which was the continuation of the *Réflexions morales*. In 1681 he was banished to Orleans. Refusing to sign a theological formulary imposed on the Oratorians, he left the order in 1684, joined Arnauld in Brussels, and there published in 1694 a complete edition of his *Réflexions morales*. The angry controversies to which this book gave rise in France and the Low Countries caused Quesnel to be imprisoned by the Spanish authorities, but he escaped and found refuge in Amsterdam. The work was condemned by Clement XI., July 13, 1708, and still more solemnly in the famous bull *Unigenitus*, Sept. 8, 1713. Among Quesnel's other important works are: *Abrégé de la morale de l'Évangile* (3 vols., 1687); *Tradition de l'Église romaine sur la prédestination des saints et sur la grâce efficace*, under the pseudonym of Sieur Germain (4 vols., Cologne, 1687); *Discipline de l'Église tirée du Nouveau Testament et de quelques anciens conciles* (2 vols., Lyons, 1689); *Histoire abrégée de la vie d'Antoine Arnauld* (2 vols., Liège, 1699); *Justification de M. Arnauld* (3 vols., 1702); *La souveraineté des rois défendue contre Leydeker* (Paris, 1704); *Recueil de lettres spirituelles* (3 vols., 1721). There are several English translations of the *Réflexions morales*.

QUETELET, Lambert Adolphe Jacques, a Belgian statistician, born in Ghent, Feb. 22, 1796, died in Brussels, Feb. 17, 1874. When scarcely 18 years old he was appointed professor of mathematics in his native town, and five years later at the Athenæum in Brussels. In 1824 the king of the Netherlands sent him to Paris to

complete his astronomical studies; and on his return in 1826, he was charged with superintending the building of an observatory, of which he was director until his death. Between 1827 and 1829 he visited England, Scotland, Germany, Switzerland, and Italy. He was perpetual secretary of the academy of sciences of Belgium, president of the central statistical committee, and corresponding member of the French institute. His most important publications are: *Recherches sur la reproduction et la mortalité, et sur la population de la Belgique* (1832); *De l'influence des saisons sur la mortalité aux différents âges* (1833); *Sur la théorie des probabilités appliquées aux sciences morales et politiques* (1846); *Du système social et des lois que le régissent* (1848); *Sur la statistique morale et les principes qui doivent en former la base* (1848); and *Anthropométrie* (1873). From 1833 he published an *Annuaire de l'observatoire de Bruxelles*.

QUETZALCOATL (*i. e.*, the serpent or the twin with peacock or trogon feathers), the name of a mythical personage introduced into Mexican mythology by the Huastecas, a branch of the Mayas, who came, according to tradition, in boats along the coast and settled at Pánuco, without opposition from the former possessors, though in course of time they held their own against the Otomies, Nahoas, and Chichimecas, till they were finally conquered by the great monarch Nezahualcoyotl. The Natchez are supposed to have been also a part of this body of emigrants. This mythical personage appeared in a long white robe, holding a staff, and introduced the honors paid to the cross. He taught the people many arts, introduced a system of worship, and finally returned to Yucatan according to Mexican tradition, though in Yucatan, where he is known as Cuculcan, they make him return to Mexico. The accounts given of him are not always consistent, and may apply to a series who bore the name. He was ultimately honored as a god, and especially as the god of rain. The religious ideas introduced by him were not confined to the Huastecas, but extended to the whole Mexican empire.

QUEVEDO Y VILLEGAS, Francisco Gomez de, a Spanish author, born in Madrid, Sept. 26, 1580, died at Villanueva de los Infantes, Sept. 8, 1645. He was educated at the university of Alcalá, and took a degree in theology at the age of 15. Having killed a nobleman in a duel, he fled to Sicily, where the viceroy, the duke of Osuna, gave him honorable employment, and on his removal to Naples made him minister of finance. On visiting Madrid on diplomatic business, he was pardoned and received a pension. He was concerned in the conspiracy of the marquis of Bedmar against Venice (1618), and narrowly escaped from that city with his life. After the disgrace of his patron (1620) he was kept a prisoner at his country seat, La Torre de Juan Abad, for three years and a half, but was released without trial. He pub-

lished in 1631 a collection of the poetry of Luis de Leon, and *Poesías del bachiller de la Torre*, being probably the work of Quevedo himself. Being falsely accused in 1639 of writing some satirical verses which had been laid under the king's napkin at dinner, he was kept for nearly four years in rigorous confinement, where he contracted diseases from which he never recovered. His papers having been twice seized by the government, the greater part of his works have never been printed. Among his published writings are treatises "On the Providence of God;" "God's Politics and Christ's Government," in which he endeavors to collect a complete body of political philosophy from the example of the Saviour; "On a Holy Life;" "The Militant Life of a Christian," &c. His most celebrated works are his prose satires, more witty than delicate. Among these are his "History and Life of the great Sharper, Paul of Segovia" (1627); his treatise "On All Things, and many more;" "The Tale of Tales;" and "Letters of the Knight of the Forceps" (*Cartas del caballero de la Tenaza*, 1635). His *Sueños*, or "Visions," perhaps the most popular and effective of his satires, were published collectively in 1635, and translated into English by Sir Roger L'Estrange in 1708. A collection of Quevedo's poetry was made by Salas in 1648, another by Alderete in 1670, under the title of "The Spanish Parnassus, divided into two Summits, with the Nine Castilian Muses." There is a complete edition of his works by Sancho (11 vols. 8vo, Madrid, 1790-'94), and a later collection by Guerra y Orbe (Madrid, 1852). A translation of the satirical works appeared at Edinburgh in 1798.

QUICHÉS, Kichés, or Utlatecas, a semi-civilized nation of Guatemala, occupying at the time of the conquest the greater part of what is now called Los Altos, or the highlands of Guatemala, including the districts of Quiché, Totonicapam, and Quesaltenango. Their traditions indicate that they sprung from the Toltec stock. Their records, as written out by members of the royal house immediately after the conquest, give a long array of kings, and imply a high antiquity. It seems that the Kachiquels and Zutugils were once embraced in the Quiché kingdom, and that their separation was the act of the king Acxopil, who divided his power with his two sons, retaining to himself the capital and surrounding regions, which preserved the name of Quiché. These three divisions, subsequently becoming hostile, were easily conquered by the Spaniards. Alvarado encountered his most vigorous resistance in Quiché, where the king, Tecum-Umam, went out to meet him, according to the chroniclers, with 232,000 men. They fought with great bravery, but musketry and cannon, and above all the terror inspired by the Spanish horse, proved too powerful for the rude means of resistance at their command. The battle lasted six days, the Indians fighting desperately as they fell back. The king at last was slain by

Alvarado, and the subjugation of the Quichés was completed.—The ruins of the city of Quiché, described by Mr. Stephens, attest the grandeur and power of this people, and give a fair support to the early accounts of their numbers. The district which they occupied is the best populated portion of Guatemala, and is almost purely Indian, the ancient language being still in general use. The people are described by Arthur Morelet as "an active, courageous race, whose heads never grow gray, persevering in their industry, skilful in almost every department of art, good workers in iron and the precious metals, generally well dressed, neat in person, with a firm step and independent bearing, and altogether constituting a class of citizens who only require to be better educated to rise equal to the best." Their language is regarded as a purer dialect than either the Kachiquel or Zutugil, with which it is compared by Fray Ildefonso Flores, in his *Arte de la lengua Kachiquel* (Guatemala, 1753). Much has been done recently for a better knowledge of this people by Brasseur de Bourbourg, especially in his *Grammaire de la langue Quiché mise en parallèle avec ses deux dialectes Cakchiquel et Tzutuhil, avec un vocabulaire, servant d'introduction au Rabinal Achi, drame indigène* (Paris, 1862), and *Popul Voh, le livre sacré et les mythes de l'antiquité américaine, avec les livres héroïques et historiques de Quiché* (1861).

QUICHUAS, the dominant people in the empire of Peru under the incas, who made their language the general one of their territory. The Quichuas extended from Lake Titicaca to Quito, and toward the coast to the territory of the Chinchas and Yuncas. The Aymaras, extending from Lake Titicaca to what is now the southern limit of Bolivia, were first reduced by the Quichuas under the incas. The Quichuas are gay, cheerful, energetic, and under the wise sway of the incas seem to have risen rapidly in many arts. They were assiduous cultivators of the soil; maize and other grains raised in Titicaca were sent to all parts of the empire as sacred presents, and the inca himself gave an example of the honor of agriculture. They wove and spun the wool of the llama, vicuña, and alpaca; they worked mines of gold, silver, and copper; built suspension bridges; erected adobe houses with gables, niches, and arches, and temples of the same material or stone, cutting and fitting the blocks with an accuracy and finish that cannot be excelled; made sterile tracts productive by a wise and extended system of *azéguías* and aqueducts, and also by excavating till moisture was reached. In astronomy they had not reached as high a degree as the Mexicans; and in literature, though preserving records mainly by *quipus* or knotted cords, they cultivated poetry, and had dramas as well as touching songs that won the admiration of the Spaniards. The incas claimed to descend from the sun, and introduced the worship of that luminary. They reduced the

Chancas and Huancas, apparently intrusive eastern tribes, and then attacked the Yuncas, the people of the coast, whose capital was at Chimú near Trujillo, and who worshipped Pachacamac, creator of the world, of whom there was a famous idol and temple at the place that still bears the name, the god Rimac, who had a famous oracle near Lima, and other deities. After a long and bloody war the inca Capac Yupanqui overthrew Chuqui Manca, king of Chimú, and reduced the Yuncas. They were compelled to accept the sun worship, but the inca allowed the temple of Pachacamac to stand, as its fame was spread through most of South America. There are remnants of the Yuncas still retaining their language at Moche, Eten, &c.; it is entirely different from the Quichua. The priests of the sun dressed in white, and practised celibacy and fasts; near each temple was also a convent of virgins of the sun. The men wore woollen tunics and leggings, the women long skirts and short cloaks, joined by gold, silver, or copper clasps. The incas were distinguished by the *llautu*, a fillet with a ball descending between the eyes. After the Spanish conquest the Indians lost much of the arts they had gained, and retrograded generally. A desperate effort was made by the Quichuas in the last century to recover their freedom, but their leader, Tupac Amaru, a descendant of the incas, was taken and torn in pieces by horses in the plaza of Cuzco in 1780.—There is a series of grammars of the Quichua, beginning with that of Fray Domingo de San Tomas (Valladolid, 1560), and coming down to Markham, "Contributions toward a Grammar and Dictionary of Quichua" (London, 1864). *Ollantay*, a Quichua drama, and several songs of the *haravecs* or bards, have been published.

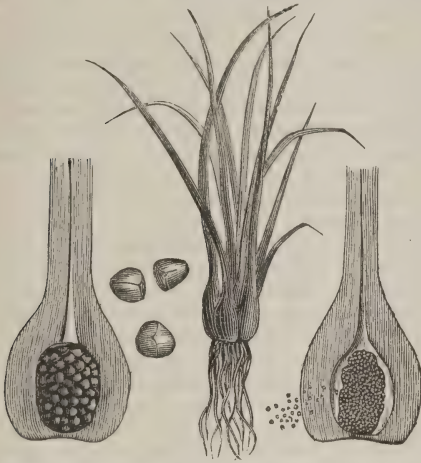
QUICKSILVER. See MERCURY.

QUIETISM. See MOLINOS.

QUILIMANE, or **Kilimane**, a town and military station in the Portuguese territory of Mozambique, on the E. coast of Africa, situated on the left bank of the river Quilimane, the N. arm of the Zambesi, 12 m. from the sea, in lat. 17° 45' S., lon. 36° 44' E.; pop. about 12,000. It is irregularly built, some of the dwellings being of brick, some of mud, and many of reeds and grass; but there are gardens, with orange and cocoanut trees, about many of the houses. Its principal trade is the export of slaves. The Portuguese garrison consists of a commandant, a few Europeans, and about 50 native troops. Quilimane is one of the very few places on the Mozambique coast actually occupied by the Portuguese, but it is very unhealthy and fast decaying.

QUILLWORT, a genus of cryptogamic plants so called from having some resemblance to a bunch of quills; they are mostly aquatics, and being evergreens, Linnaeus called the genus *isoëtes* (Gr. *ισος*, equal, and *ετος*, year); this is placed by some botanists in the family of club mosses (*lycopodiaceæ*), while others give it the rank of an order. The external appear-

ance of the plants is that of a tuft of linear leaves, attached by their enlarged bases to a very short rootstock, from the lower part of



Quillwort (*Isoetes lacustris*). A small plant of natural size; magnified bases of two leaves, showing macrospores and microspores; and macrospores greatly magnified.

which roots are produced. The organs of reproduction are curiously concealed; the sporangia or spore cases are orbicular or ovoid, plano-convex, and sessile in the axils of the leaves, the bases of which are hollowed out to receive and partly cover the sporangia, which are united to them by the back. The spores are of two kinds, those in the cases of the outer leaves being very much larger than those near the centre of the cluster. The large spores (macrospores) are from 20 to 200 in a spore case, and are divided into two hemispheres by a line, one of the halves being marked by three radiating lines; the minute spores of the inner leaves (microspores) are so small that it is estimated that each case contains over a million; they are obliquely oblong and triangular. Ten or a dozen species are found in the whole country, one of which, *I. lacustris*, occurs also in northern Europe and Asia, and is found along our northern border from New England to Lake Superior; it has 10 to 25 leaves, 2 to 6 in. long; the largest species, *I. Engelmannii*, has from 50 to 200 leaves, often 25 in. long. These singular plants are not rare, but they escape general notice from their resemblance to submerged grasses.

QUILOA. See KILWA.

QUIMPER, a town of France, capital of the department of Finistère, on the Odet, 32 m. S. E. of Brest and 13 m. from the Atlantic; pop. in 1872, 13,159. It is partly surrounded by ancient walls and watch towers. The cathedral of St. Brentin, begun in 1239 and finished in 1493, was rebuilt in 1858 from the designs of Viollet-le-Duc. There are ship yards, manufactories of pottery, fisheries, and trade in grain, horses, honey, and cattle. Formerly it was the capital of Cornouailles.

QUIN, James, an English actor, born in London, Feb. 24, 1693, died in Bath, Jan. 21, 1766. He was educated at the university of Dublin, and when 20 years old went to London, and began to study law in the Temple. Having obtained an engagement at Drury Lane, he at first acted subordinate parts, but gained some reputation in the character of Bajazet. In 1720 he secured his fame by acting Falstaff in the "Merry Wives of Windsor," and greatly increased it in 1731 by excelling Barton Booth in the part of Cato; and on the appearance of Garrick in 1741, he stood at the head of his profession. In 1748 he retired from the stage, thereafter residing at Bath, but performed Falstaff every year till 1753, refusing to play afterward because he had lost his voice. He received a pension from George III., whom in his youth he had instructed in elocution.

QUINARY SYSTEM. See ENTOMOLOGY, and ORNITHOLOGY.

QUINAULT, Philippe, a French dramatist, born in Paris, June 3, 1635, died there, Nov. 26, 1688. When about 18 years old he produced on the stage a five-act comedy, *Les rivaux*, which was received with applause. He studied law, married a rich widow, assumed the title of councillor before the parliament, and bought an office as auditor in the court of exchequer. In 1664 he produced *La mère coquette, ou Les amants corrigés*. *Astarte* (1663), his only tragedy which is now remembered, was ridiculed by Boileau. He wrote lyrical tragedies to which Lully furnished the music. He was elected a member of the French academy in 1670. His complete works were published in 1739 and 1778 (5 vols. 12mo).

QUINCE (the plural of old Eng. *coine*, from Fr. *coing*, which is derived from the Lat. *cydonia*, from the Cretan town of Cydonia), a



Apple-shaped Quince (*Pyrus Cydonia*).

tree long cultivated in temperate climates for its fruit, and which is found wild in southern Europe, northern Africa, and in various parts

of Asia. Arguments have been presented to show that the golden apples of the Hesperides were quinces instead of oranges; at all events the fruit was held in high esteem by the ancients, who had several distinct varieties. The quince has usually been placed in a separate genus, *Cydonia*, but modern botanists class it with the apple and pear in *pyrus*, and according to this view its botanical name (in most works given as *Cydonia vulgaris*) is *pyrus Cydonia*. The chief botanical difference between the quince and the apple and pear is, that it has numerous ovules in each cell and the seeds are surrounded by mucilage, while the others have only two ovules in the cell and are without mucilage. The quince seldom grows over 15 ft. high, and when left to itself is disposed to form a bush with numerous crooked branches rather than a tree; its oval or ovate deciduous leaves are entire, and covered with a cottony down on the under side. The flowers are produced singly at the ends of short branches of the current season, which bear five or six leaves, and appear late in spring; they have leafy calyx lobes, and large white or rose-colored petals. The large fruit is pear- or apple-shaped, very downy when young, but smooth when mature, of a fine golden yellow color, and very fragrant; the flesh hard, and in most varieties very austere and unfit for eating raw. The fruit is much used for preserves, and for making marmalade and jellies, and is sometimes added to apples which of themselves lack character in making pies and sauce. The seeds have long been used medicinally; their epidermis is so abundantly supplied with mucilage that one part of dry seed will coagulate 40 parts of water; it has but little adhesive power, and is regarded as a modification of cellulose. A decoction is used as a demulcent application, and is sometimes added to eye washes; the perfumed mucilage, called bandoline, was once a popular dressing for the hair.—The quince is a profitable fruit, though very much neglected; because it will give some returns when set in an out-of-the-way place and allowed to run wild, it is a popular impression that this is the proper treatment for it; the tree will abundantly repay good culture, and when properly trained to a tree form it is very ornamental both in flower and in fruit. The leading varieties are the apple- or orange-shaped and the pear-shaped. The first named under good cultivation sometimes reaches a pound in weight, and is often depressed-spherical in shape. The other has not only the more elongated form indicated by its name, but ripens two weeks later; its flesh is less tender than that of the apple-shaped variety. The Portugal is such a poor bearer that it is but little cultivated, though its fruit is of superior quality and turns crimson when cooked. Rea's seedling, which originated in Greene co., N. Y., and is but little known as yet, produces a fruit of excellent quality and from a third to

a half larger than any other. An important use of the quince is for stocks upon which to graft or bud the pear (see PEAR), which upon a quince root becomes much dwarfed and fruits very early. The ordinary varieties of quince do not answer for this purpose, as they are of too slow growth; two kinds are used, both of which originated in France, the Angers and the Fontenay or Paris quince, both of which bear fruit inferior in quality to those already named. The quince is easily propagated; cuttings taken off in the fall and set out at once, or kept buried till spring, root readily; it is also propagated by layering in the ordinary manner, and for the production of stocks for the pear by what is known as mound or stool layers. (See LAYERING.) To train the quince in the tree form, a shoot should be selected as a leader and kept tied to a stake until of the proper height, cutting off all the shoots which start below; when a strong stem is thus produced, it is to be cut back to a desirable height, and four or more branches allowed to grow to form the head.—The Chinese quince, *pyrus* (or *Cydonia*) *Sinensis*, is occasionally seen in cultivation; it is said to reach 20 ft. in China, but is here not more than half that height; its ovate leaves are acuminate at both ends, and smooth; its small flowers appear in May, are rosy red with a violet tinge, and quite ornamental; the fruit is very large, egg-shaped, and green, but useless, being hard and dry.—The Japan quince, *P. (Cydonia) Japonica*, was introduced into English gardens in 1815, and



Japan Quince (*Pyrus Japonica*).

has become one of the most popular ornamental shrubs. When trained to a wall it has reached 15 ft. high, but it is usually only 5 or

6 ft. and much branched, its spray being terminated by thorns. The oval leaves, somewhat wedge-shaped at the base, are serrate, smooth, and, with the conspicuous kidney-shaped stipules, very dark green. The flowers appear just before the leaves and in great abundance; in the ordinary form they are bright scarlet inclining to crimson, but there are garden varieties with white and blush flowers, and of several shades of red to dark crimson; also varieties in which the flowers are semi-double. The fruit somewhat resembles a small apple, is yellowish green, and has a very strong and rather agreeable odor; it is uneatable raw or cooked, but is sometimes put into drawers to perfume their contents. This is well suited for an ornamental hedge, as it bears clipping well and has remarkably clean and bright foliage; when in bloom nothing can be more brilliant. It is readily propagated by cuttings of the roots.

QUINCY, a town of Norfolk co., Massachusetts, on Quincy bay, and on the Old Colony railroad, 7 m. S. S. E. of Boston; pop. in 1830, 2,201; in 1840, 3,486; in 1850, 5,017; in 1860, 6,778; in 1870, 7,442. It is celebrated for its quarries of granite, large quantities of which are shipped to all parts of the country. It contains two national banks, with a joint capital of \$300,000; a savings bank, with more than \$1,000,000 deposits; eight schools, including a high school; a weekly newspaper; and nine churches. It is noted as the birthplace of Gov. John Hancock, and Presidents John Adams and John Quincy Adams. The principal village is beautifully situated on an elevated plain near the centre of the town. The most noteworthy buildings are the town house, of granite; the Adams temple, a granite church containing monuments in memory of John Adams and John Quincy Adams and their wives; and the Adams and Quincy mansions. Quincy was formed from Braintree in 1792.

QUINCY, the capital of Adams co., Illinois, and the second city in the state in population, situated on the Mississippi river, 160 m. above St. Louis and 95 m. W. of Springfield; pop. in 1837, 1,653; in 1850, 6,902; in 1860, 13,718; in 1870, 24,052, of whom 7,733 were foreigners and 1,073 colored; in 1875, estimated by local authorities at 35,000. It is handsomely situated on a limestone bluff 125 ft. above the river, of which and of the surrounding country it commands an extensive view. It is regularly laid out and well built, chiefly of brick, and has fine water works. The streets are lighted with gas, and the principal ones are traversed by horse cars. There are many substantial business blocks and handsome residences, the latter being surrounded by well kept grounds. It contains four small parks and several cemeteries. About 2 m. from the centre of the city are well appointed fair grounds comprising about 80 acres. The trade of Quincy is extensive, the river affording ample water communication, and eight lines of

railroad rendering tributary a wide and fertile region. The railroads centring here are: the Chicago, Burlington, and Quincy; Toledo, Wabash, and Western; Hannibal and St. Joseph, crossing the Mississippi on a magnificent railroad bridge recently completed; Quincy, Carthage, and Burlington; Quincy, Missouri, and Pacific; St. Louis, Keokuk, and Northwestern; Quincy, Alton, and St. Louis; and Missouri, Kansas, and Texas. The facilities for manufacturing are good. The various establishments employ an aggregate of about 3,500 hands, and produce annually goods to the value of about \$10,000,000. Among the more important are 10 manufactories of wagons and ploughs, 4 of furniture, 3 of carriages, 4 of plug tobacco, 1 of corn planters, 11 of brick, 2 of organs, 2 of canned fruit and pickles, 8 iron foundries (producing stoves and general castings), 11 flouring mills, 1 paper mill, 1 woollen mill, 4 planing mills, 2 grain and 2 fruit distilleries, 5 rectifying establishments, 6 breweries, and a grain elevator with a capacity of 150,000 bushels, besides manufactories of cigars, cooperage, soap and candles, files, hoes, sewing machines, matches, &c. Pork packing employs 7 firms, and 15 establishments are engaged in the gathering and shipment of ice. There are 7 banks, with an aggregate capital of \$1,000,000. Quincy is divided into 6 wards, and is governed by a mayor and a board of 12 aldermen. It has an efficient police force and a well organized fire department. The principal charitable institutions are two hospitals and three asylums. There are nine public schools, embracing a high school and grammar, intermediate, and primary departments, attended by about 3,000 pupils; also several academies. A medical college was incorporated in 1873. The Quincy library has 4,000 volumes. Three daily (one German), one tri-weekly, and four weekly (one German) newspapers, and two monthly (one German) periodicals are published. There are 30 churches, viz.: 4 Baptist (1 colored), 1 Christian, 1 Congregational, 2 Episcopal, 4 Evangelical, 2 Evangelical Lutheran, 1 Jewish, 6 Methodist (1 colored), 2 Presbyterian, 6 Roman Catholic, and 1 Unitarian.—The first white settler established himself on the site of Quincy in 1822. It was laid out in 1825 and incorporated as a town in 1834. It received a city charter in 1839.

QUINCY. **I. Josiah, jr.** (so called to distinguish him from his father, who survived him), an American lawyer, born in Boston, Feb. 23, 1744, died at sea off Gloucester, Mass., April 26, 1775. He graduated at Harvard college in 1763, and studied law. After the passage of the stamp act he denounced the oppressions of the parliament and its violations of the rights of the colonists, in public meetings and through the press. Though of a slender frame and imperfect health, he had a voice of great compass and beauty, and a graceful and passionate delivery. His name is associated with those of James Otis and Joseph Warren, as men who

were most powerfully influential in causing the revolution. On the arrest of Capt. Preston and the soldiers who fired upon the people in the "Boston massacre" of March 5, 1770, application was made on their behalf to Mr. Quincy and to John Adams to act as their counsel. This duty they accepted in the face of the strongest popular opprobrium, and on the trials the next autumn the acquittal of the prisoners justified their course. In 1773 Quincy on account of ill health sailed to Charleston, S. C., returning on horseback in the spring. During this tour he put himself in communication with the principal whigs of the southern and middle states, and established a plan of correspondence between them and the Massachusetts patriots. Besides his speeches in town meetings and other public assemblies, he made bold and animated appeals through the newspapers, under various signatures. In May, 1774, he published under his own name his principal political work, "Observations on the Boston Port Bill, with Thoughts on Civil Government and Standing Armies." In it he distinctly declares the inevitable necessity of the appeal to arms which soon followed, and plainly shadows forth independence as the necessary result. This work was republished in London, and excited much attention on the part both of ministerialists and the opposition. An attempt was made to deter him from publishing it by an elaborate letter sent to him anonymously, but believed to have proceeded from a high functionary of the government. To this letter he made a brief but spirited reply through the "Massachusetts Gazette," and forthwith proceeded with the publication. He was prevailed upon in September, 1774, to go to England on a private mission for the popular cause, as well as for the good of his health. This visit excited considerable notice in London. He had interviews, at their own request, with Lord North and Lord Dartmouth, and was in constant intercourse with Dr. Franklin, Col. Hartley, Gov. Pownall, the earl of Shelburne, Col. Barré, Dr. Priestley, Dr. Price, and other prominent friends of America. Lord Hillsborough denounced him in his place in the house of lords, as a man who, if the government did its duty, "would be in Newgate or at Tyburn." He prepared to return early in the spring of 1775, against the advice of his physician, but died just before arriving. Almost his last words were that he should die content could he have but an hour's interview with Samuel Adams or Joseph Warren. His "Reports of the Supreme Court of Massachusetts Bay, 1761-'72," was edited by S. M. Quincy (8vo, 1865). See also his life by his son Josiah Quincy (8vo, 1825; new ed., 1875). II. Josiah, an American statesman, son of the preceding, born in Boston, Feb. 4, 1772, died in Quincy, July 1, 1864. He received his early education at Phillips academy, Andover, and graduated at Harvard college in 1790. He studied law in Boston, and began practice in 1793. In 1804 he

was elected state senator, and in 1805 became a member of congress, where he served till 1813. During the whole of this period the federal party was in a hopeless minority; its only service was one of protest, and Mr. Quincy was its most prominent and efficient member in the discharge of this duty. The embargo, the war of 1812, the erection of the Orleans territory into a state, which were the chief public measures of that period, he encountered with the most untiring hostility. He was one of the first, if not the first, among northern men to denounce the slaveholding interest as a rising and dangerous tyranny. In 1813, having declined a reelection, he returned to private life, dividing his year between Boston and his country seat at Quincy. He was immediately elected a member of the state senate, and joined in the protest of the legislature against the war and the admission of Louisiana, and reported the famous resolution, occasioned by a proposed vote of thanks to Capt. Lawrence for the capture of the Peacock, to the effect that in a war waged without justifiable cause and for conquest and ambition, it was not becoming a moral and religious people to express approbation of exploits not immediately connected with the defence of the seacoast and harbor. He remained in the state senate till the close of 1820, when he was dropped by the federal managers under an impression that his uncompromising course had weakened his popularity, but was immediately elected to the house of representatives at the head of the ticket, and chosen speaker, which office he held while in the house. In 1822 he resigned to take the office of judge of the municipal court of Boston. He first laid down the law in the case of Joseph T. Buckingham, indicted for a libel on John N. Maffit, that the publication of the truth, with a good intention, and for a justifiable end, is not libellous. This ruling excited much censure at the time, but is now the acknowledged rule of law in this country and in England. In 1823 he left the bench to become mayor of Boston, being the second incumbent of that office, which he held till 1828, when he was chosen president of Harvard university. He was inaugurated in June, 1829, and held the post till August, 1845, when he resigned. In 1856 he took a prominent part in the effort to elect Fremont to the presidency. Besides many speeches in congress and orations on particular occasions (the chief of which are those on July 4, 1826, the jubilee of independence, on the second centennial celebration of the settlement of Boston, September, 1830, and the second centennial of Harvard university, September, 1836), Mr. Quincy published "Memoir of Josiah Quincy, jr., of Massachusetts" (Boston, 1825; new ed., 1875); "History of Harvard University" (2 vols., Cambridge, 1840); "The Journals of Major Samuel Shaw, the first American Consul at Canton, with a Life of the Author" (Boston, 1847); "The History

of the Boston Athenæum" (Cambridge, 1851); "The Municipal History of the Town and City of Boston during two Centuries" (Boston, 1852); "The Life of John Quincy Adams" (1858); and "Essays on the Soiling of Cattle" (1859).—See his life by his son Edmund Quincy (1867), who also edited his "Speeches delivered in the Congress of the United States" (8vo, 1875). **III. Edmund**, an author, son of the preceding, born in Boston, Feb. 1, 1808, died in Dedham, May 17, 1877. He graduated at Harvard college in 1827. He published "Wensley, a Story without a Moral" (Boston, 1854), and a "Memoir of Josiah Quincy" (8vo, 1867), and was a frequent contributor to periodicals and newspapers. He was long prominent among the Garrisonian abolitionists.

QUINCY, Quatremère de. See QUATREMÈRE DE QUINCY.

QUINET, Edgar, a French author, born in Bourg, department of Ain, Feb. 17, 1803, died in Paris, March 27, 1875. He studied German literature in Germany, and spent some time in Greece. He was professor at Lyons from 1839 to 1842, when he became the first incumbent of the new chair of the languages and literature of southern Europe at the collège de France. In 1846 he was suspended on account of his inflammatory lectures, but he was triumphantly reinstated after the revolution of Feb. 24, 1848, in which he took a part, and was returned to the constituent and legislative assemblies. In January, 1852, he was banished, and lived abroad till 1870, when he resumed his professorship. In 1871 he took his seat in the national assembly, and opposed peace with Germany and all cession of territory. He wrote much on the literature of Germany, France, and southern Europe, several books of travel, and many remarkable political pamphlets. His principal works are: *Ahasvérus* (1833); *Des Jésuites* (in conjunction with Michelet, 1843); *Les esclaves*, a dramatic poem (1853); *La révolution religieuse au XVII^e siècle* (1857); *Merlin l'enchanteur* (2 vols., 1860); *La révolution* (2 vols., 1865; 5th ed., 1868); *La création* (2 vols., 1870); and *L'Esprit nouveau* (3d ed., 1875).—His wife, a Moldavian lady, in 1868 published *Mémoires d'exil*.

QUINIC ACID. See KINIC ACID.

QUININE, or Quinia. See CINCCHONA.

QUINSY (*tonsillitis, amygdalitis, or cynanche tonsillar*; Fr. *esquinancie*), common inflammatory sore throat. Though called tonsillitis, the inflammation is rarely confined to the tonsils, but involves the pharynx, the soft palate, and the uvula, and sometimes extends to the root of the tongue. It commences with a feeling of dryness and discomfort about the throat, and with pain in swallowing. The mucous membrane lining the throat is reddened, and the tonsils are more or less swollen. As the disease advances, the inflamed parts, at first preternaturally dry, become covered with viscid mucus, and the distress of the patient is greatly enhanced by the efforts which he is

tempted to make to remove this secretion. In many cases suppuration occurs in one or both tonsils; when this takes place those organs are often enormously swollen, and together with the obstruction of the inflamed palate may render breathing difficult and painful. In such cases the febrile reaction is strongly marked, the skin being hot, and the pulse full and frequent; the patient is unable to take nourishment, and the voice becomes thick and characteristic of the disease. The pain, exceedingly acute when the patient attempts to swallow, or to clear his throat of the viscid matter which adheres to it, often extends to the ear, and is sometimes attended with partial deafness. The bursting of the abscess in the tonsil is at once followed by relief; the matter has a nauseous taste and often an exceedingly offensive smell. The disease, though very painful, is attended with little danger; but the inflammation may by extension involve the larynx and thus prove fatal, and cases are on record in which death has occurred from the ulceration having involved a branch of the carotid artery.—The disease requires but little treatment. Where the mucous membrane alone is involved, astringent gargles, repeated five or six times a day, usually give relief and tend to shorten the course of the inflammation. The food should be liquid (soups, beef tea, milk, &c.), and should be swallowed in large mouthfuls, which give less pain in deglutition than smaller ones. If an abscess forms in either or both of the tonsils, the greatest relief is obtained from frequent inhalations of warm steam, which acts as a poultice to the inflamed parts. As soon as the location of the abscess can be determined, it should be opened and the pus evacuated, after which there is usually no further trouble.

QUINTANA, Manuel José, a Spanish poet, born in Madrid, April 11, 1772, died there, March 11, 1857. He was educated at Salamanca and practised law for a time at Madrid; but he soon turned his attention to letters. His tragedy of *El duque de Visco* (1801), imitated from "The Castle Spectre" of M. G. Lewis, was not successful. In 1802 he produced a small volume of lyric poems, the patriotic spirit of which immediately brought them into favor; and in 1805 he placed upon the stage his *Pelayo*, intended to rouse his countrymen to resist foreign oppression, which was equally well received. His *Vidas de los Españoles célebres* (3 vols. 8vo, 1807-'34), and *Poesías selectas castellanas* (3 vols. 8vo, 1808), with critical notes, were prepared with the same patriotic motive. At the outbreak of the rising against the French in 1808 he published his *Odas a España libre*, and, both through the press and as secretary to the cortes and the regency, exerted himself to the utmost in behalf of his country; but after the return of Ferdinand VII. from France in 1814, Quintana was confined for more than six years in the fortress of Pamplona. He was delivered by the revolution of 1820, and after

its overthrow in 1823 he remained in Estremadura until the accession of Isabella II., whose education he superintended. In 1835 he was created a senator, and in 1855 crowned by the queen with laurel. His complete works have been published in Rivadeneyra's *Biblioteca de autores españoles* (1852).

QUINTILIAN (QUINTILIANUS), **Marcus Fabius**, a Roman rhetorician, born probably at Calagurris in Spain about A. D. 40, died about 118. He was educated at Rome, and was an advocate and teacher of eloquence. Among his pupils were the younger Pliny and the two grand-nephews of Domitian, by which monarch he was invested with the consular honors and title. He was the first public teacher of oratory who received from the imperial treasury a regular salary (100,000 sesterces a year), the endowment having been made by Vespasian. He continued his teaching for about 20 years, with the greatest success. His great work was *De Institutione Oratoria Libri XII.*, called also *Institutiones Oratorie*, which is both a complete system and a model of eloquence. There are 164 declamations falsely ascribed to him. The first complete manuscript of the "Institutes" was discovered by Poggio Bracciolini in the monastery of St. Gall. The *editio princeps* was printed at Rome by Lignamine (fol., 1470); the best edition is that by Spalding and Zumpt (6 vols. 8vo, Leipzig, 1798-1829). The "Institutes" have been translated into English by Guthrie (2 vols. 8vo, London, 1756), by Patsall (2 vols., 1774), and by Watson (2 vols., 1856).

QUINTUS CURTIUS RUFUS. See CURTIUS.

QUINTUS ICLILIUS. See GUISCHARD.

QUITCLAIM, a word often used in deeds, and usually in connection with words of grant and conveyance, when the grantor or seller intends to convey to the grantee or buyer all the right, title, interest, and estate of the grantor, but without any warranty whatever, whether of title, quantity, or anything else. Sometimes a deed purports to be a deed of "grant and quitclaim," when the grantor adds to the words of grant and conveyance words of limited warranty: as, for instance, warranty against himself and all persons claiming by, from, through, or under him. Even this limited warranty, and still more a general warranty, would estop the grantor from ousting the grantee by any better title, not coming through the grantee, which was outstanding at the time, and which the grantor might acquire subsequently. But if the deed were one of grant and quitclaim only, without any warranty, the grantor might then assert such a title. For example, A sells and conveys to B, by grant and quitclaim only, for a full price, an estate to which it turns out A has no title. But A subsequently acquires title to it by inheritance from the true owner. A may now recover the estate from B; but not if he granted with warranty, because if he then took the estate by his better title, B would turn round upon him on the warranty

and get the estate back again. Quitclaim is also used in receipts, usually with such words as release and discharge, when it is intended to signify that the party giving the receipt or release agrees never to make any claim against the other party for any existing demand.

QUITMAN, a S. W. county of Georgia, separated from Alabama by the Chattahoochee and drained by Pataula creek and other streams; area, 190 sq. m.; pop. in 1870, 4,150, of whom 2,377 were colored. The surface is undulating and the soil productive. It is traversed by a branch of the Southwestern railroad. The chief productions in 1870 were 79,610 bushels of Indian corn, 4,151 of oats, 15,615 of sweet potatoes, and 3,880 bales of cotton. There were 287 horses, 473 mules and asses, 1,734 cattle, and 2,828 swine. Capital, Georgetown.

QUITMAN, John Anthony, an American politician, born in Rhinebeck, Dutchess co., N. Y., Sept. 1, 1799, died in Natchez, Miss., July 17, 1858. He studied law in Ohio, and in 1821 settled in Natchez, Miss. In 1827 he was elected to the legislature, from 1828 to 1834 was chancellor of the state, and afterward president of the state senate. In 1836 he raised a small body of men to aid the Texans, and after the capture of Santa Anna returned to Natchez, where he became major general of militia and filled several local offices. In July, 1846, he was appointed brigadier general in the United States army, and ordered to report to Gen. Taylor at Camargo. At the battle of Monterey he distinguished himself by his successful assault on Fort Tenerice, and his daring advance into the heart of the city. At the siege of Vera Cruz he commanded in the first sharp engagement, and subsequently led an expedition against Alvarado, in conjunction with the naval forces under Com. Perry. He was with the advance under Gen. Worth that took possession of the city of Puebla, where he was brevetted major general and received a sword voted to him by congress. At Chapultepec he stormed the formidable works at the base of the hill, pushed forward to the Belen gate, which he carried by assault, and took possession of the city of Mexico, of which the general-in-chief on his arrival appointed him governor. After establishing order and discipline he returned to the United States, and was soon after, almost by acclamation, elected governor of Mississippi. Being threatened with arrest for alleged complicity with Gen. Lopez in organizing an expedition to Cuba, he resigned his office and went to New Orleans in the custody of the United States marshal; but after an abortive effort to obtain evidence, the prosecution was abandoned. The democratic party in Mississippi immediately renominated him for governor, but he withdrew from the contest when the people, at an election for delegates to a state convention, condemned his opposition to the compromise measures. In 1855 he was elected to congress, and in 1857 reelected without

opposition. During his whole term he was at the head of the military committee. His parliamentary fame rests chiefly on his celebrated speech for the repeal of the neutrality laws, and his argument on the powers of the federal government, which made him the recognized head of the state rights party. His life has been written by J. F. H. Claiborne (2 vols. 12mo, New York, 1860).

QUITO, a city of Ecuador, capital of the republic, and of the province of Pichincha, in a district of its own name formed by a valley in the Andes; lat. $0^{\circ} 13' S.$, lon. $78^{\circ} 43' W.$; pop. about 70,000. Built upon the slopes of several hills on the E. flank of the volcano Pichincha, at an elevation of nearly 10,000 ft. above the sea, it has but two approaches from the south and one from the north, the eastern and western portions being hemmed in by precipitous mountains. The streets are narrow and mostly unpaved, and the houses, owing to the frequency of earthquakes, are generally of one story. Many houses are built on arches over two deep ravines which traverse the town from E. to W., through which rush down torrents of melted snow from the neighboring volcanoes, and which here and there present dangerous precipices. Water is distributed by pipes in the houses of the rich, and by handsome stone fountains embellishing the public squares. The principal public edifices are the cathedral, archiepiscopal palace, city hall, and government house, all in the Plaza Mayor, one of the finest public squares in South America. Most of the churches are attached to large convents. There are three hospitals, one being for elephantiasis, asylums for the blind and the insane, a university once famous for the number of its students, a seminary, a college, and a number of public and private schools. An academy of arts and sciences, and schools of agriculture, obstetrics, and sculpture, were to be organized in 1873. Quito has several libraries, chief of which is that of the old Jesuit college, with about 20,000 volumes. The mint occupies part of the same structure as the university. The climate is salubrious; the mean annual temperature is about $60^{\circ} F.$, and the extremes 45° and 75° . Elephantiasis is very common. The foreign commerce is mostly in produce sent to Central America, and some precious metals to Peru, all by the

port of Guayaquil. The manufactures include coarse cottons and woollens; there are a few silk-weaving establishments, the raw material for which is mainly imported from France, but recent attempts to acclimatize the silkworm bid fair to prove successful. The women make very fine gold lace, and excellent embroidery, needlework, and lace. Quito communicates with Bogotá by a good road, the only one worthy the name in the republic before the commencement of a carriage road to lead from Guayaquil to Quito, save in the space between Sibamba and Pueblo Nuevo, over which a railway is to extend. There is a telegraph from Quito to Guayaquil.—The history of Quito goes back to a remote antiquity. Of its primitive rulers, tradition preserves the names of a number who were called Quita. About A. D. 280 the city is said to have been captured by certain foreign invaders, who, under the name of Siris, maintained their dominion until the invasion of the inca Huayna Capac, who subdued the entire kingdom. At his death he divided his kingdom between his two sons, Atahualpa and Huascar, leaving to the first the sceptre of Quito, and to the second that of Cuzco. War ensued between the brothers, in which Atahualpa obtained control of all the provinces. But his triumph was of short duration, and he lived to find himself the prisoner of the Spanish adventurer Pizarro. Taking advantage of the capture of his king, Rumiñagui, one of the inca generals, usurped regal authority in Quito, but fled to the mountains on the approach of Sebastian Benalcázar. Under the Spanish dominion Quito, erected into a presidency, first formed part of the viceroyalty of Peru; afterward it was attached to that of Santa Fé, and subsequently restored to that of Peru, to which it remained attached until the independence of the country, when it was aggregated with Venezuela and New Granada in the republic of Colombia. On the dissolution of that republic in 1831, it was organized, with the districts of Asuay and Guayaquil, into a new republic under the name of Ecuador. The modern city was founded in 1534 by Benalcázar; it was incorporated as a city in 1541, and erected into a bishopric four years later. Several disastrous earthquakes have occurred here, especially those of Feb. 4, 1797, and March 22, 1859.

R

R, THE 18th letter and 14th consonant of the English alphabet. It is a lingual and a liquid or semi-vowel, being pronounced both before and after most other consonants. It is found in all languages except the Chinese and the tongues of some of the North American Indians. The Romans borrowed it from the Greek *rho* (P, ρ), which is derived from

the Hebrew and Phœnician *resh*. It is one of the last which children learn to pronounce, and those who have been engaged in teaching persons deaf from birth to articulate find the greatest difficulty in conveying any idea of its sound to their pupils. The most common mode of pronouncing it is by an expiration while the tongue touches the roof of the mouth with a

tremulous motion, as in the word *rhetoric*. The tremulous sound is more distinct in the Spanish *rr*, which indeed is not readily learned by Englishmen or Americans. It is frequently exaggerated by the Irish and softened down by the English, who are more easily distinguished by their peculiar pronunciation of this letter than by that of any other.—The Romans often added an *r* to words which they borrowed from the Greek, as *νύξ*, *nurus*; *μύαξ*, *murex*; and on the other hand they often dropped it from the nominative case of nouns and retained it in the oblique cases, as *αἶς*, *αῖς*; *οἶς*, *οῖς*. It was interchanged sometimes with *s*, the words *arena*, *laribus*, *pignora*, *Furii*, *Valerii*, and *Papirii* having been anciently written *asena*, *lasibus*, *pignosa*, *Fusii*, *Valesii*, and *Papisii*. The same change is observed in some modern languages, as Eng. *hare*, Ger. *haase*; Eng. *was*, Ger. *war*. It is most frequently interchanged however with *l*. The Chinese, who cannot pronounce *r*, always use *l* in its place; the Japanese do exactly the reverse. (See L.)—As a Roman numeral R denotes 80, or with a dash over it (\bar{R}) 80,000. The Greek P with a dash over it stands for 100, and with a dash under it for 100,000. As an abbreviation, R signifies *Roma*, *Romanus*; R. P., *res publica*; R. C., *Roma condita*.

RAAB (Hung. *Győr*). I. A W. county of Hungary, in the Trans-Danubian circle, bordering on Presburg, Comorn, Veszprém, Oedenburg, and Wieselburg; area, 1,590 sq. m.; pop. in 1870, 103,637, chiefly Magyars. The surface is level, except in the south. The extensive marsh of Hanság is in the western portion. The chief rivers are the Danube and the Raab. The principal products are corn, wine, fruits, cattle, and sheep. II. A city (anc. *Arrabona* or *Rabona*), capital of the county, in an extensive plain at the junction of the Rabnitz and Raab, near the entrance of the latter (which rises in Styria) into an arm of the Danube, known as the Little Danube, 67 m. W. N. W. of Buda; pop. in 1870, 20,035, including about 5,000 Germans. The old cathedral has been restored and embellished, and the episcopal palace is a striking building. The academy of law was reopened in 1867, and the city has a theological faculty and a Catholic and a Protestant gymnasium. In the vicinity is the Benedictine abbey of Szent-Márton (Martinsberg), one of the oldest in Hungary. In the 10th century the town regained the importance which it once possessed as a Roman colony in Pannonia, and it was generally kept in a state of defence by the Hungarian kings, but suffered during their warfare with the emperors of Germany. The Turks took it in 1595, and were expelled in 1598 with great loss, by Schwarzenberg and Pálffy. The fortress was finally razed in 1820. The Hungarian army of "insurrection" (defensive rising *en masse* of the nobility) was defeated in the plain of Raab by Eugene Beauharnais, June 14, 1809. In 1848-'9 it was strongly fortified

by the Hungarians, who were here defeated by the Austrians under Haynau, June 28, 1849.

RABANUS (or **Hrabanus**) **MAURUS**, a German theologian, born in Mentz about 776, died at Winkel in 856. He was educated in the Benedictine convent of Fulda, and continued his studies in Tours under Alcuin, who gave him the surname of Maurus in honor of St. Maurus. He returned to Fulda in 804, founded there the first public convent school in Germany, and labored especially for the spread and improvement of the German language. He wished to free the German church from the influence of Rome, and succeeded in introducing the rule that the clergy should only preach in the native tongue. He has also the merit of having given a new impetus to Biblical research by requiring the study of the original tongue of the New Testament. These innovations drew upon him the displeasure and suspicion of the clerical party, and though finally elevated to the rank of an abbot, he laid down his office in 842 to live in the priory of St. Peter; but in 847 he resumed teaching, and was consecrated archbishop of Mentz. Among his works is *Glossaria Latino-theodisca*, which is now an important monument of the earliest phase of the German language. He wrote also *De Universo*, *De Arte Grammatica Prisciani*, and several other theological treatises. His works (exclusive of the *Glossaria*) were published by Calvenerius (6 vols. fol., Cologne, 1627).

RABAT, a town of Morocco, in Fez, on a bay of the W. coast, at the mouth of the Burekrag or Bu-Regreb, opposite the town of Salé; pop. about 20,000, including many Jews. The custom house and the minaret of the principal mosque are remarkable specimens of Moorish architecture; most of the other Moorish buildings are in decay, and there are many houses built in European style. Rabat was founded in the 13th century, and together with Salé was long notorious as a haunt of pirates. The imports in 1874, chiefly cotton goods, amounted to \$58,000, and the exports, chiefly of wool (exclusive of specie), to \$27,000.

RABBATH-AMMON. See PHILADELPHIA (Palestine).

RABBI (Heb., my master, lord, or teacher), a title of honor bestowed on the doctors of the Jewish law since the 1st century B. C. The Hebrew or Aramaic words *rab*, *rabba*, *rabbān* (master), *rabbōni* (my master), and *rabbenu* (our master), have also been employed in the same sense. The title *rabbi* or *rabbīn* is frequently applied to the Talmudic writers, the Jewish theological writers of post-Talmudic times (see HEBREWS), whose dialect is therefore called rabbinical, and the religious heads of Jewish congregations. The Jews of eastern Europe and others attach *Rab*, both in conversation and writing, to the name of every married Jew of good reputation.

RABBIT, the common name of several species of the hare family, especially the *lepus cuni-*

culus of Europe and the *L. sylvaticus* of North America; the family and generic characters have been given under HARE. The European rabbit or cony (*L. cuniculus*, Linn.), the *lapin* of the French, is about 16½ in. long, with the tail 3 in. additional, and the ears also 3 in.;



European Rabbit or Cony (*Lepus cuniculus*).

the tarsus shorter than in the hare; the general color gray brown, white below, the back of the neck rufous; tail white below, blackish above, but pencilled with dirty white; ears not tipped with black; compared with that of the hare, the skull has the muzzle, inter-orbital space, and incisive openings narrower; the mammae are five pairs, two pectoral and three ventral. In the wild state the rabbit inhabits Europe, except the more northern portions, and N. Africa; it is thought to be originally from Spain, but, being hardy, has been carried to most parts of the world; it is easily distinguished from the hare by its smaller size, grayish color, and short feet and ears; it also differs from the hares in its burrowing habits. Unable to escape from its enemies by speed, it seeks safety in deep holes dug in dry sandy places, living in society in what are called warrens, with an ample supply of food, in places suitable for burrows, such as sandy heaths covered by a prickly furze. Remaining concealed by day, they come out at twilight in search of food, and often do considerable mischief by digging up the newly sprouted corn and gnawing the bark from young trees; these warrens are often of large extent, and a source of great profit from the flesh and skins of the animals, which are caught in snares and traps, dug or drowned out, and hunted by dogs and ferrets. They begin to breed at the age of six months, have several litters in a year and five to eight at a time; the period of gestation is about three weeks, but, as the uterus is double, there may be two distinct litters at an interval of a few days; the young are born blind and naked, in a nest lined with the mother's soft fur; they are said to live eight or nine years. They seem to have social laws, the same burrow being transmitted from parent to children, and enlarged as the family increases. Rabbits and hares appear to be

natural enemies; they are not found in the same localities, and when they meet they generally engage in combat; when brought up together they do not produce a fertile offspring *inter se*, and hybrids probably never occur between them in the natural state. It has been estimated that in four years a single pair of rabbits would, if unmolested, become the progenitors of more than 1,250,000; but this increase is checked by the persecution of man and of carnivorous beasts and birds. Their ravages are more than counterbalanced by their flesh, which forms a nutritious and easily digested food, and by their skins, which are used in making hats and are dyed to imitate more expensive furs. The name rabbit or cony is erroneously applied in the translation of the Hebrew Scriptures to the *shaphan*. (See HYRAX.) Rabbits are easily domesticated, and in this state vary greatly in colors, size, and character of fur; black, white, and gray are the prevailing colors; in the silver-gray variety the hairs are white and black; the Angora rabbit is noted for the length and softness of its white fur; in the lop-eared varieties the size is three or four times that of the wild animal, and the ears are more or less bent downward from the base. When tame they do not pair like those in a wild state, and lose more or less the instinct of burrowing; their flesh is also inferior in flavor, though more delicate and digestible; the tame males not unfrequently kill the young.—The American gray rabbit (*L. sylvaticus*, Bach.) is about 16½ in. to the root of the tail, and 26½ in. to the end of the outstretched legs, the tail to the end of the hairs 2¾ in.; fur and pads of the feet full and soft; on the back light yellowish brown, lined with black, grayer on the sides; on the rump mixed ash, gray, and black, pure



American Gray Rabbit (*Lepus sylvaticus*).

white below; upper surface of tail like the back, below pure cottony white; posterior edge of ears whitish, edges of the dorsal surface toward the tip black, the rest ashy brown; fur lead-colored at the base. This is among the largest of the short-eared *leporidae* of America,

being largest in the west and smallest and coarsest-haired in the south; it is found almost throughout the United States, from the southern parts of New Hampshire to Florida, and west to the upper Missouri, being most abundant in sandy regions covered with pines. It also frequents woods and thickets, concealing itself in its form, in thick bushes, or in holes in trees or under stones by day, coming out at night to feed; in clover and corn fields, vegetable gardens, and nurseries of young trees, it does much mischief. It does not dig burrows like the European rabbit, and comes rather in the class of hares; when pursued it runs with great swiftness and with few doublings to its hole in a tree or rock; though it will breed in enclosed warrens, it does not become tame, and has not been domesticated. It is very prolific, or else it would be exterminated by its numerous enemies; it often runs into the hole of the woodchuck, skunk, fox, or weasel, in the last three cases often falling a victim to the inhabitant of the burrow; it is hunted by dogs, shot from its form, and caught in snares and traps; its flesh is much esteemed. It somewhat resembles the European rabbit in its gray color, but it does not change its colors like the latter, and is smaller and more slender. Hybrids are sometimes produced between this species and the domesticated European rabbit which has escaped from confinement into the woods. The sage rabbit (*L. artemisia*, Bach.), from the west and the plains of Mexico and Texas, cannot be satisfactorily distinguished from the last species. The jackass rabbit or Texan hare (*L. callotis*, Wagl.) is so named from its very long ears, measuring about 5 in., though the animal is rather smaller than the European hare; it is yellowish gray above, waved irregularly with black, upper part of tail black, sides gray, and dull whitish below; nape sooty black; it is found in Mexico, Texas, and Oregon, and on the plains. The long and slender legs indicate rapid locomotion and a capacity for making long leaps; it is a solitary and not very common species, and has not been found in California.

RABELAIS, François, a French author, born in Chinon, Touraine, about 1490, died about 1553. He was educated at the convent of Seuillé and the monastery of La Baunette, and was ordained as a priest in 1511. He then made up for former idleness by devoting himself to the study of ancient and modern languages, mastering the Latin, Greek, Italian, Spanish, German, English, Hebrew, and Arabic. Greek had especial attraction for him; and this involved him in serious quarrels with his fellow monks, who were fiercely hostile to the study. The ill feeling grew so strong that in 1524 he obtained permission from Pope Clement VII. to enter the order of Benedictines. He spent several years in their house at Maillezais, but in 1530 abandoned monastic life and repaired to Montpellier to study medicine. In 1532 he was a physician at Lyons,

and published annotated and corrected editions of Hippocrates, Galen, and others. From 1533 to 1550 he published several editions of a facetious production, in which he endeavored to destroy faith in astrology. At Lyons also he published the first rough sketch of the strange work upon which his fame rests: *Les faits et dictz du géant Gargantua et de son fils Pantagruel* (1533). Jean du Bellay, his old schoolmate, bishop of Paris and afterward cardinal, having been appointed French ambassador to Rome, engaged Rabelais as his physician, and obtained for him from Pope Paul III. a bull, dated Jan. 17, 1536, remitting the penalties which he had incurred by the abandonment of his order. He then became a member of the abbey of St. Maur des Fossés at Paris, where he remained till 1542, when he was presented with the comfortable living of Meudon. Here he applied himself faithfully to the duties of his ministry, and devoted his leisure hours to the completion of his great work, three books of which had already appeared. This being done in 1551, he went again to Paris, published the fourth book, and spent his later years at Meudon. Such are the ascertained facts of a life which has been egregiously misrepresented. No performance in French literature had greater success in its time, or has since attracted so much attention, as his "Gargantua and Pantagruel." It is a ruthless attack upon monks, princes, kings, and all ecclesiastical and civil authorities. Amid its chaos of eccentricities and allusions to persons and events, of good sense and folly, of delicate thoughts and gross obscenities, commentators have tried in vain to unravel the work. According to the best authorities, Gargantua stands for King Francis I.; Grandgousier for Louis XII.; Pantagruel for Henry II.; Picrocole for Maximilian Sforza, duke of Milan; Gargamelle for Anne of Brittany, the queen of Louis XII.; Badebec for Claude of France, queen of Francis I.; Grandejument de Gargantua for Diana of Poitiers; Panurge for the cardinal de Lorraine; and Frère Jean des Entemeurs for Cardinal du Bellay. Be this as it may, "the work was entirely in accordance with the taste of his age," as Vinet remarks; "and excellent minds which could appreciate its fine parts were also delighted with those that are repulsive to our taste." Lord Bacon called Rabelais "the great jester of France;" others have called him a "comic Homer." More than 60 editions of the work have been published; that of Burgaud des Marets and Rathery (2 vols. 12mo, Paris, 1857-8) is the most convenient and acceptable, with a good biographical and critical notice, explanations, notes, &c. There are several English translations. That of Sir T. Urquhart (1653; reprinted by the Maitland club, 4to, 1838) was adopted by both Ozell and Motteux as a basis. Their united translation is often reprinted; the last edition is by Bohn (2 vols., London, 1850). Sixteen private let-

ters of Rabelais were published in 1651.—See Ginguené, *De l'autorité de Rabelais dans la révolution présente et dans la constitution civile du clergé, ou Institutions royales, politiques et ecclésiastiques tirées de Gargantua et de Pantagruel* (Paris, 1791).

RABIES. See HYDROPHOBIA.

RABUN, the N. E. county of Georgia, bordering N. on North Carolina and E. on South Carolina, from which it is separated by the Chattooga river; area, about 320 sq. m.; pop. in 1870, 3,256, of whom 119 were colored. The surface is mountainous; the Blue Ridge forms the W. boundary and then curves through the N. portion of the county. The chief productions in 1870 were 4,080 bushels of rye, 71,376 of Indian corn, 2,704 of Irish potatoes, 3,915 of sweet potatoes, 4,208 lbs. of tobacco, 5,541 of wool, and 19,868 of butter. There were 481 horses, 470 mules and asses, 1,170 milch cows, 453 working oxen, 1,855 other cattle, 4,086 sheep, and 6,672 swine. Capital, Clayton.

RACCOON (*procyon*, Storr), a genus of American plantigrade mammals of the bear family, of the section *subursinæ*. In this genus the size is comparatively small, the body stout, and the tail moderately long, bushy, and not prehensile; the muzzle is pointed, and the end very movable and slightly projecting; the teeth are: incisors $\frac{3}{2}$ — $\frac{3}{2}$, canines $\frac{1}{2}$ — $\frac{1}{2}$, premolars $\frac{4}{2}$ — $\frac{4}{2}$, and molars $\frac{3}{2}$ — $\frac{3}{2}$, in all 40, there being one upper true molar on each side less than in the bears. The shape is not unlike that of the badger, though the legs are longer; ears moderate, erect, and covered with hair; head broad behind and flat, with naked and large muffle; whiskers in four principal horizontal series, five or six bristles in each; feet five toed, with naked soles and no indication of webs; claws curved, not retractile, and sharp; though

brown; an oblique black patch on the cheeks, continuous with a paler one beneath the jaw, and another behind the ears; the end of muzzle, ears, and posterior part of cheek patch whitish; tail bushy, with the tips and five rings black, and the nearly equal interspaces rusty white; hind feet 4 in. long, dirty white above, the fore feet $2\frac{1}{2}$ in.; mammae six, ventral; there are anal glands which secrete a somewhat offensive fluid. Some varieties occur nearly black, others are nearly white. The raccoon is found generally over the United States, as far north as lat. 60° in the interior, as high as Newfoundland on the Atlantic, and further north on the Pacific; it is most abundant in the southern states, frequenting retired swamps covered with high trees and well watered. It is an excellent climber, in this way obtaining eggs and young birds; watching the soft-shelled turtle lay her eggs in the sand, it uncovers and devours them; it seizes ducks as they come to the water, and is extremely fond of ripe and juicy corn, as well as of frogs and shell fish. It is not entirely nocturnal, and sometimes visits the corn fields and the poultry yard at midday; it feeds much on an inferior oyster in the southern states, hence called the raccoon oyster; it also eats rabbits, squirrels, and other rodents, fish, nuts, and honey. It has been generally supposed to dip its food in water before eating it, hence its specific name of *lotor* or washer; but this, which it does not generally do in captivity, according to Bachman, is probably only an occasional habit. It hibernates during the coldest weather in the northern states. It is shy, and has an acute sense of smell; it brings forth about the month of May, in a nest in a hollow tree, four to six at a time, about the size of half-grown rats, which utter a plaintive infant-like cry. It is a favorite sport of the southern negroes in winter to hunt "coons," driving them to a tree, and then climbing up and shaking them off, or felling the tree to bring them within reach of the dogs; they sell the skin to the hatters, and eat the flesh, which is generally very fat and tender, with a flavor of pig. Many are caught also in traps, and are hunted by torchlight. In captivity it makes a very cunning and interesting pet, being easily tamed so as to follow its master even into the crowded street, ambling along in the manner of a bear, and adroitly picking his pockets of dainties. The crab-eating raccoon (*P. cancrivorus*, Illig.), from Brazil and the northern parts of South America, is longer and more slender than the common species, grayish above shaded with brown and black, and yellowish below; the face is whitish, with a black band surrounding each eye; tail less distinctly annulated. Its habits are nearly the same as in the other species, but it is more arboreal; it is equally omnivorous; its flesh is also used as food. It is found on the seacoast and in the interior, and as far south as Paraguay.

RACHEL, in Biblical history. See JACOB.



Raccoon (*Procyon lotor*).

plantigrade when standing, the gait is rather digitigrade. The common raccoon (*P. lotor*, Storr) is 22 or 23 in. long, with the tail about a foot additional; the general color is grayish white, the tips of the long hairs black and giving this tint to the back; under surface dark

RACHEL (*Élisabeth Rachel Félix*), a French actress, born at Mumpf, Switzerland, Feb. 28, 1820, died at Cannet (near Toulon), France, Jan. 3, 1858. She was the daughter of a Jewish peddler, whom she accompanied as a strolling singer and guitar player. While singing in a café in Paris she attracted the attention of Achille Ricourt, a theatrical manager and writer on art, and of Choron, who in 1831 began to give her instruction in music. As she showed a great talent for the stage, he transferred her to the care of Saint-Aulaire, under whom she made rapid progress in elocution. Her personation of Hermione at a private performance procured her admission in 1836 as a pupil of the conservatory; and on April 24, 1837, she appeared at the Gymnase theatre in *La Vendéenne*, a vaudeville written for her by Paul Dufourt. She attracted little attention, and for more than a year did not again appear prominently. In the mean time she studied assiduously under Samson, and on Sept. 7, 1838, produced a great sensation as Camille in Corneille's *Les Horaces* at the Théâtre Français. The long neglected plays of Corneille, Racine, and Voltaire were speedily revived for her, and she became best known as Eriphile in *Iphigénie*, Aménaïde in *Tancrède*, Roxane in *Bajazet*, Pauline in *Polyeucte*, as Athalie, and especially as Phèdre and Camille. She was also much admired in other parts, such as Joan of Arc, Mary Stuart, and Adrienne Lecouvreur; and during the excitement of 1848 she produced a great effect by her peculiar rendition of the *Marseillaise*. She excelled most in the impersonation of lofty classical heroines and in the delineation of the fiercer emotions, and was celebrated for the magnetism of her gestures and voice, her singular air of distinction, dignity, grace, and repose, and her wonderful identification with the characters she represented. Her income, originally 4,000 francs, soon rose to 80,000; and in 1849 she effected an arrangement at the Théâtre Français, by which six months of absence in each year were allowed her. The receipts from her performances in the French provinces and in England reached enormous sums, and in Russia in 1853 she received 400,000 francs. In 1855, in company with her brother Raphaël Félix, her sisters Sarah, Lia, and Dinah, and a complete troupe, she gave performances in New York, Boston, and other cities of the United States, and then went to Havana to regain her strength; subsequently she spent some time in Egypt, and finally sought relief in southern France; but all attempts to arrest the progress of her disease (consumption) proved unavailing. Rachel was slender, rather tall, with a finely modelled head, clear, pale complexion, and features capable of the greatest variety of expression. She died unmarried and a Jewess, but left two sons, who were educated as Catholics.

RACINE, a S. E. county of Wisconsin, bordering on Lake Michigan; area, about 350 sq.

m.; pop. in 1870, 26,740. It is watered by several streams, and is traversed by the Chicago, Milwaukee, and St. Paul, the Chicago and Northwestern, and the Western Union railroads. The surface is nearly level, and the soil productive. Limestone is found. The chief productions in 1870 were 339,739 bushels of wheat, 376,398 of Indian corn, 393,127 of oats, 25,983 of barley, 164,219 of potatoes, 164,321 lbs. of wool, 610,228 of butter, and 43,070 tons of hay. There were 5,395 horses, 7,257 milch cows, 6,747 other cattle, 37,620 sheep, and 7,423 swine; 12 manufactories of agricultural implements, 6 of boots and shoes, 5 of brick, 13 of carriages and wagons, 22 of clothing, 2 of iron castings, 3 of lime, 8 of saddlery and harness, 3 of sash, doors, and blinds, 2 of woollens, 7 flour mills, 8 tanneries, 6 currying establishments, 6 breweries, and 3 planing mills. Capital, Racine.

RACINE, a city and the county seat of Racine co., Wisconsin, on Lake Michigan, at the mouth of Root river, and on the Chicago and Northwestern railroad, 23 m. S. of Milwaukee and 62 m. N. of Chicago; pop. in 1860, 7,822; in 1870, 9,880; in 1875, 13,282. It is built on a plateau projecting about 5 m. into the lake and elevated about 40 ft. above its level. The climate is cold in winter and cool and bracing in summer; the mean annual temperature is about 44°. The streets are wide and cross each other at right angles, the principal ones being bordered by shade trees. Main street is the business thoroughfare, and its upper portion is lined with elegant residences. The city is connected with Rock Island, Ill., by the Western Union railroad. The harbor is one of the best on the lake, and is accessible by vessels drawing 14 ft. A considerable tonnage is owned here, and the lake commerce is important. The lumber trade is large and increasing. Manufacturing is the chief interest, and to this Racine owes most of its wealth and prosperity. The value of products in 1874 was \$4,179,265. The principal establishments are 8 wagon factories, 8 carriage factories, 5 fanning-mill works, 10 tanneries, 2 trunk factories, 5 harness and saddle factories, 3 sash and blind manufactories, 3 foundries and machine shops, 6 saw mills, a paper machine factory, a woollen mill, a wire manufactory, a wagon lock manufactory, a manufactory of threshers, a linseed oil mill, a basket factory, and a silver-plating factory, besides many other establishments. There are two national banks, with a joint capital of \$400,000, two elevators, a dredge company, and seven hotels. The assessed value of property in 1875 was \$4,200,000. The public schools are excellent, and the Roman Catholics have a flourishing academy. Racine college, under the control of the Episcopalians, was founded in 1852. The buildings are situated in handsome grounds, 10 acres in extent, at the upper end of Main street. The institution comprises a collegiate department, with classical and scientific courses, and

a grammar school, with classical and mathematical courses. In 1874-'5 it had 18 instructors, 180 students, of whom 135 were in the grammar school, and a library of 3,000 volumes. Four weekly newspapers are published, of which one is in the Bohemian language. There are 24 churches.—Racine was first settled in 1834. The first post office was established in 1836; the first steamer entered the harbor in 1844. It was incorporated as a city in 1848. Its growth has been rapid.

RACINE, Jean, a French dramatist, born at La Ferté-Milon, Île-de-France, Dec. 21, 1639, died in Paris, April 22, 1699. He studied at the college of Beauvais, at Port Royal, and at the college of Harcourt. He won the friendship of Boileau and Molière and the good will of Louis XIV., who gave him a pension in 1660 for his ode on occasion of his marriage. His reputation as a dramatic poet of remarkable genius was firmly established in 1667 by his *Andromaque*, and in rapid succession appeared *Les plaideurs*, a comedy (1668), *Britannicus* (1669), *Bérénice* (1670), *Bajazet* (1672), *Mithridate* (1673), *Iphigénie en Aulide* (1674), and *Phèdre* (1677). The last, one of his masterpieces, was so coldly received, owing to the intrigues of his enemies, that he ceased to write for the stage, and devoted himself exclusively to his duties as official historiographer of the reign of Louis XIV. At the suggestion of Mme. de Maintenon he wrote in 1689 *Esther*, a Biblical drama, for the young ladies at the seminary of St. Cyr, where it was performed, and in 1691 *Athalie*, which was only recited, and not performed at the Théâtre Français until a much later period. Boileau regarded this as one of his finest productions, and it is still used in schools as a model of dramatic eloquence. In 1697 appeared his memoir on the unhappy condition of France, which he had written at the request of Mme. de Maintenon. Louis XIV. was displeased with it, and Racine's death is said to have been hastened by his grief on this account. He left some prose writings, which are marked by terseness, perspicuity, and eloquence. The last quality is peculiarly striking in his speech before the academy on the reception of Thomas Corneille (Jan. 2, 1685), when he paid a warm tribute to the genius of Corneille's illustrious brother. His miscellaneous poems also possess high merit. The most valuable complete editions of his works are by Pierre Didot the elder (3 vols. fol., Paris, 1801-'5), richly illustrated and forming part of the magnificent Louvre editions; by La Harpe (7 vols. 8vo, 1807); Geoffroy (7 vols., 1808); Aimé Martin, with notes from the principal commentators (7 vols., 1820); and Mesnard (5 vols., 1865-'9), to be completed in 7 vols., and to form part of the new editions of *Les grands écrivains de la France*, under the direction of Adolphe Régnier.—Racine's second son, Louis (1692-1763), wrote two didactic poems, *La grâce* and *La religion*, remarkable, especially the latter, for elegance, but deficient in most

other respects; they are chiefly intended to vindicate the principles of Jansenism. His *Mémoires sur la vie et les ouvrages de Jean Racine* (2 vols., 1747) is a more valuable performance. Among his other works is a prose translation of Milton's "Paradise Lost."

RADCLIFFE, Ann, an English novelist, born in London, July 9, 1764, died there, Feb. 7, 1823. Her maiden name was Ward. At the age of 22 she married Mr. William Radcliffe, a student of law, who afterward became editor and proprietor of "The English Chronicle," a weekly newspaper. Her first novel, "The Castles of Athlin and Dunbayne" (1789), gave little indication of her powers, though it had the wild and improbable plot and the unnatural characters which distinguish her later writings. "The Sicilian Romance" (1790) is much better, and the "Romance of the Forest" (1791) is sufficient to place her at the head of all writers of melodramatic romance. "The Mysteries of Udolpho" (1794) is generally regarded as her masterpiece. About the time this work was produced she made a tour through Germany, and in 1795 published "Journey through Holland," &c., with some observations on the lake district of England. Her last novel, "The Italian," which deals with racks, tortures, dungeons, confessionals, monks, and inquisitors, appeared in 1797. After her death there were published "Gaston de Blondville, a Romance," "St. Alban's Abbey, a Metrical Tale," and some poems, together with a memoir by T. N. Talfourd (4 vols., 1826); and a collection of her poems appeared in 1834.

RADCLIFFE, John, an English physician, born in Wakefield, Yorkshire, in 1650, died at Carsalton, near London, Nov. 1, 1714. He graduated at University college, Oxford, in 1669, studied medicine, and in 1675 began to practise in Oxford. In 1682 he received the degree of M. D., and in 1684 removed to London, where he soon acquired an extensive practice. He was appointed principal physician to the princess Anne in 1686, and in 1713 was elected to parliament by the town of Buckingham. Many anecdotes are recorded of his wit and rudeness of speech, which sometimes verged upon brutality. He bequeathed nearly his whole fortune to public uses, dividing it mostly between University college, Oxford, and the foundation at Oxford of a library with especial reference to medical science. This is known as the Radcliffe library.—See "Life and Letters of Dr. Radcliffe," by W. Pitts (8vo, London, 1736).

RADETZKY, Joseph Wenzel, count, an Austrian general, born at Trzebnitz, Bohemia, Nov. 2, 1766, died in Milan, Jan. 5, 1858. He was in active service from 1784, and in 1805 was made a major general. He contributed much to the victory at Aspern and Essling, May 21 and 22, 1809, and commanded the Austrian cavalry at the battle of Wagram, having been raised to the rank of lieutenant field marshal. After the peace he was made chief of the quartermaster general's staff, and councillor of the minister of

war, in which capacity he had a large share in the reorganization of the army. In the campaigns of 1813-14 and 1815 he was chief of the staff of Field Marshal Schwarzenberg, had an important share in the victory at Kulm, and was severely wounded at the battle of Leipsic. In 1831 he took command of the Austrian troops in Italy, and in 1836 was made field marshal. During the revolution of 1848, though an octogenarian, he evinced remarkable vigor and equal ability as a commander. From March 18 to March 23 combats between the Austrian troops and the insurgents constantly took place in the streets of Milan. On the latter day Radetzky evacuated the city and retreated behind the Mincio, with his headquarters at Verona; but the advance of Charles Albert at the head of a large army compelled him to retire behind the Adige. After the reduction of Peschiera by the Sardinian army, May 30, he feigned a general retreat, reduced Vicenza, Treviso, and Padua, thus securing his rear, and rapidly returned to Verona. His victory at Custoza (July 25) forced the Piedmontese to retreat, and from this time the success of the Austrians was assured. Milan capitulated on Aug. 6, and an armistice of six weeks was agreed upon between Sardinia and Austria. Charles Albert having resumed hostilities in March, 1849, Radetzky invaded Piedmont, and on March 23 gained the decisive victory of Novara. He now marched against Venice, which after a protracted siege finally surrendered, Aug. 23. Radetzky was made governor general and military commander of the whole country, the duties of which situation he performed with unmitigated rigor. On Feb. 28, 1857, at the age of 90, he retired from command.

RADIATA, or **Radiates**, next to the *protozoa* the lowest of the great branches of the invertebrates, whose characteristic feature is that of radiation from the mouth as a centre. All live in the water, and most are marine. They were divided by Agassiz into polyps, aculephs or jelly fishes, and echinoderms, the last class the highest, which have been described under these titles respectively. As they are among the lowest in rank in the animal kingdom, they are among the earliest in time. Huxley divides the old branch of radiates into the subkingdom *coelenterata*, including the hydroids, sea anemones, corals, and aculephs; and (in part) the subkingdom *anneluloida*, including the echinoderms. In the latter subkingdom he places also the intestinal and some minute aquatic worms, an association not generally accepted by naturalists. His classification, in detail, is as follows: Subkingdom *coelenterata*, having the alimentary canal communicating freely with the body cavity; with no heart or circulating system, and in most with no nervous system. Class A, *hydrozoa*, with walls of the digestive sac not separated from those of the body cavity, with the reproductive organs external; containing subclasses I., *hydroida* (hydroid zo-

ophytes), with orders: 1, *hydrida* (hydra); 2, *corynida* (tubularia); 3, *sertularida* (sea fir); II., *siphonophora* (oceanic), with orders: 4, *calycophoridae* (diphyes); 5, *physophoridae* (Portuguese man-of-war); III., *discophora* (jelly fish), with order 6, *medusida*; IV., *lucernarida* (sea blubbers), with orders: 7, *lucernariadae*; 8, *pelagida*; 9, *rhizostomida*; V., *graptolitida* (extinct). Class B, *actinozoa*, with stomach opening into body cavity, which is divided into compartments by vertical partitions, and with reproductive organs internal; with orders: 1, *zoantharia*, with rounded tentacles in multiples of five or six, as the sea anemones, star and brain corals, and madrepores; 2, *alcyonaria*, with fringed tentacles in multiples of 4, as *alcyonium*, tubipores, sea pens, and red coral; 3, *rugosa* (extinct); 4, *ctenophora*, oceanic jelly fishes like Venus's girdle and *pleurobrachia*. In the subkingdom *anneluloida*, the alimentary canal is shut off from the body cavity, and there is a distinct nervous system, generally a blood-circulating system, and a water-vascular system. The only class which concerns the radiates is the *echinodermata*, with the five living orders of crinoids, ophiurans, star fishes, sea urchins, and holothurians, and the two extinct low orders of blastoids and cystoids, allied to crinoids.—See papers on "The Mode of Growth of the Radiates," by Prof. Packard, in the "American Naturalist," March, 1875, *et seq.*

RADIOPHONY. See supplement.

RADISH (Lat. *radix*, root), a cruciferous plant, *raphanus sativus* (Gr. *rá*, quickly, and *pháveiv*, to appear, in allusion to its rapid germination), long cultivated for its edible root. The plant has rough and lyrate lobed leaves, the flowers purple or whitish and with the structure common to the family; but the pods differ from those of the other common *cruciferae* in being divided into cells by fleshy false partitions. The radish is a hardy annual of which the nativity is uncertain, but it was in cultivation in Egypt in very early times; being valued for its root only, all improvement has been directed toward that part, and it presents a great number of varieties, from the size of a small olive up to those weighing several pounds, and in shape from long and tapering to those much broader than long; some varieties are of very rapid growth, and must be eaten when very young, while others require as long to mature as turnips, and are kept all winter. The radish is to be regarded as a condiment rather than a nutritious food; in common with cresses, horseradish, and others of the family, it possesses a highly pungent principle which contains nitrogen and often sulphur; and with the others it is regarded as possessing antiscorbutic properties. The summer varieties in ordinary culture are sown as early in spring as the soil can be prepared, but they may be had much earlier by sowing in a frame, or at any time during winter if a hot-bed is used. In market gardens, where the greatest econo-

my in land is practised, it is customary to sow a bed with beets in regular drills, and then scatter radish seed over the bed broadcast and rake it in; the radishes are gathered before the slowly germinating beets need attention; they do best upon a light warm soil that has



Varieties of Radish. 1. Chinese Winter. 2. Olive-shaped. 3. Long. 4. Turnip-shaped.

been heavily manured for some crop the previous year. In some localities a fly (*anthomyia raphanum*) makes their culture impossible; its larva, a small white maggot, is very destructive. The turnip-shaped and olive-shaped, the French breakfast, and long scarlet are the leading early sorts, and the catalogues give many others, including white and other colors. The winter varieties are sown late in July or early in August in the latitude of New York, and harvested before freezing weather; to keep them fresh, they should be packed in earth or sand. The black and white Spanish are most common, but the rose-colored Chinese is by far the best.—The rat-tailed radish is probably a distinct species (*R. caudatus*); its root is not edible, but the pods, which are 2 ft. or more long, are used for pickles, and by some liked when dressed in the manner of asparagus.—The wild radish (*R. raphanistrum*), also called jointed charlock, has yellow flowers and necklace-formed pods with a long beak; this is a common weed in European agriculture, and has firmly established itself in some of our older states; it has much the same general appearance as the true charlock (*brassica sinapisrum*, or *sinapis arvensis* of most authors), from which it is readily distinguished by its jointed pods, which when quite ripe often break up between the seeds. In 1860 M. Carrière, a French horticulturist, published an account of his experiments in improving the wild radish, and found that a careful selection gave him in four generations edible roots of as varied forms as are presented by the garden radish.

RADNORSHIRE, a county of S. Wales, bordering on Montgomery, Shropshire, Hereford, Brecknock, and Cardigan; area, 432 sq. m.; pop. in 1871, 25,430. The chief towns are Presteign, Knighton, Radnor, and Rhayader. The Wye is the principal river. The surface is mountainous, the highest point being 2,163 ft. above the sea; but the S. E. part is in general level. A great portion of the county consists of common bog and moor land. Numbers of small ponies are reared. The county was anciently inhabited by the Silures.

RADOM, a government of Russian Poland, bordering on the governments of Kielce, Piotrków, Warsaw, Siedlee, and Lublin, and bounded S. E. by Austrian Galicia; area, 4,768 sq. m.; pop. in 1870, 532,466. It is drained by the Pilica and Vistula, which bound it on the north and west, and east and southeast respectively, and their affluents. The soil is diversified, and the surface the most elevated in the kingdom of Poland, being mountainous in the S. E. part. The government of Kielce on the southwest was separated from it in 1866. The capital, Radom, is in the N. part on a small tributary of the Vistula, 60 m. S. of Warsaw; pop. in 1867, 10,944.

RADOWITZ, Joseph Maria von, a Prussian statesman, born at Blankenburg, Brunswick, Feb. 6, 1797, died in Berlin, Dec. 25, 1853. His ancestors had emigrated from Hungary. He was instructed by his mother as a Protestant, and subsequently by his father as a Catholic. He entered the army in 1813, and was wounded and captured at the battle of Leipsic. In 1815, after the restoration of peace, he settled in Cassel as a teacher of mathematics and military science at the school of cadets, and was attached in the same capacity to the household of Prince Frederick William, the future elector. In 1823 he returned to the Prussian army with the rank of colonel, and in 1845 he became general. His great influence over the crown prince, the future king Frederick William IV., gave him a prominent position, and after holding various diplomatic offices and prompting the king in 1847 to make important organic changes in the government, he retired from the army in 1848, and went to Frankfort as leader of the ultra conservatives in the German parliament. His views, however, underwent a gradual change, and he became an advocate of a constitutional monarchy and of the union of North Germany under the king of Prussia. In 1849-'50 he was foremost in Berlin and Erfurt in the general direction of affairs, and from Sept. 27 to Nov. 29, 1850, he was minister of foreign relations. He retired from this office in consequence of the opposition to his plan of a rupture with Austria. His principal works are: *Gespräche aus der Gegenwart über Staat und Kirche* (1846); *Deutschland und Friedrich Wilhelm IV.* (1848); and *Neue Gespräche aus der Gegenwart* (2 vols., 1851). His *Gesammelte Schriften* comprise 5 vols. (1852-'3).

RADZIWILL, the name of a family long distinguished in Lithuania and Poland. Nicholas IV., surnamed the Black, prince of Olyka and Nieswicz, the founder in the 16th century of the modern branch of the family, promoted the reformation, and published in 1563 the Radziwill Bible; but his sons returned to the Catholic church. One of them, Prince Christopher, made a pilgrimage to Jerusalem, of which an account has been published (Polish, Breslau, 1847; Latin, Braunsberg, 1861). He appropriated 5,000 ducats for the purchase of copies of his father's Protestant Bible, intending to destroy them. Among the other members of this family was Michael Jerome (Geron) (1778-1850), an associate of Kosciuszko in the war of independence of 1794, and of Dombrowski in 1807. During the Russian campaign of 1812, Napoleon nominated him general on the battle field. In 1831 he was for a short time commander-in-chief of the patriot army, and after its defeat by the Russians he was detained by them till 1836. Subsequently he resided in Dresden.

RAEBURN, Sir Henry, a Scottish painter, born in that part of Edinburgh formerly called Stockbridge, March 4, 1756, died July 8, 1823. He was apprenticed to a goldsmith, but obtained his release, and began portrait painting in Edinburgh, where he soon became a rival of David Martin, who then stood at the head of this branch of the art. After visiting Rome he returned to Edinburgh in 1787, and at once became the leading portrait painter there, a supremacy which he maintained until his death. Among his sitters were Sir Walter Scott, Henry Mackenzie, Dugald Stewart, Lord Eldon, George IV., Prof. Playfair, Dr. Hugh Blair, Jeffrey, and Alison. In 1814 he was elected an associate and in 1815 a member of the royal academy; and in 1822 he was knighted.

RAFF, Joachim, a German composer, born at Lachen, Switzerland, June 27, 1822. He devoted his early years to science and literature quite as much as to music. In 1843 he published a number of light pieces for the pianoforte, which met with such success that he renounced his career as a school teacher and gave himself up to the art of music. Removing to Weimar, he wrote under the auspices of Liszt, for the theatre of that city, an opera entitled *König Alfred*, which possessed no decided merit. He has since resided in Cologne, Stuttgart, and Wiesbaden, devoting himself to musical composition and to writing upon musical topics. He is one of the most prolific composers of the present day, having published about 200 pieces, mostly for the pianoforte. The works upon which his reputation chiefly rests are his six symphonies, among which the *Leonore* and *Im Walde* are most noted.

RAFFAELE. See RAPHAEL.

RAFFLES, Sir Thomas Stamford, an English official, born at sea, off Jamaica, July 5, 1781, died July 4, 1826. He was an assistant clerk in the India house at the age of 15, and in 1805

was appointed under secretary to the new government formed by the East India company at Penang. In 1807 he became chief secretary; but intense application to business affected his health, and in 1808 he was compelled to go to Malacca. By his advice an expedition was fitted out against Batavia in 1811, and when that place was captured he was appointed lieutenant governor of Java and its dependencies. He held this office for five years, during which slavery was abolished. He was knighted in 1817. In 1818 he was made lieutenant governor of Fort Marlborough at Bencoolen, Sumatra, and remained there six years, emancipating the slaves. He established the British settlement at Singapore, and founded a college there for the encouragement of Anglo-Chinese and Malay literature. The state of his health compelled him in 1824 to resign and return to England. On his homeward voyage his ship was burned, and his natural history collections were lost. He founded the zoological society, and was its first president. He published a "History of Java" (2 vols. 4to, London, 1817), and "Malayan Miscellanies" (2 vols. 8vo, Bencoolen, 1820-'22). His "Life and Remains" was edited by his widow (4to, 1830).

RAFFLESIA, a remarkable genus of apetalous, exogenous plants, named in honor of Sir Stamford Raffles. While making a tour in the interior of Sumatra, Dr. Joseph Arnold, one of the suite of Raffles, was called aside by a native to see a fine flower, and was the first European to examine the largest flower known. A drawing was made, and, with portions of the reproductive organs preserved in spirits, sent to England, where Robert Brown described it as a new genus and called it in honor of those engaged in the discovery *Rafflesia Arnoldi*; since then three or four other species have been found, all smaller than the first, and this genus and a few others form the order *Rafflesiaceae*, all of them parasites. The species of *rafflesia* are all natives of Sumatra and



Rafflesia Arnoldi.

the neighboring islands, and parasitic upon the roots and branches of species of *vitis* related to the grape. The plant consists solely of a flower, subtended by a few bracts, and directly sessile upon the stem of its host. The flower first appears as a small knob upon the vine,

which gradually enlarges, and at the end of several months the fully developed bud looks like a monstrous cabbage. The perianth is tubular below, with five entire thick lobes; the throat of the flower is surrounded by a thick and fleshy ring; within the cup or tubular portion are the stamens or pistils. In *R. Arnoldi* the flower is flesh-colored, marked with yellowish white protuberances, and the interior of the cup is of an intense purple color. The flower measures fully 3 ft. across and weighs 15 lbs.; its cup is estimated to hold 12 pints. In this as in other species the flower gives off a most repulsive odor of tainted meat, which is however attractive to insects, large numbers of which hover about it, and as the plant is dioecious they no doubt aid in its fertilization. There are several plants of the order *Rafflesiaceæ* in South America and a solitary species in the United States, described by Gray as *pilostyles Thurberi*, found upon the Gila river in Arizona; this is parasitic upon a leguminous shrub (*Dalea*), and though of the same family and having the same habit of growth with the rafflesia just described, it is as remarkable for its minuteness as that is for its Titanic proportions, the whole plant being barely a quarter of an inch across.

RAFINESQUE, Constantine Smaltz, an American botanist, born of French parents in Galata, a suburb of Constantinople, in 1784, died in Philadelphia, Sept. 18, 1842. He came to America in 1802, collected a large number of botanical specimens, and in 1805 went to Leghorn, and thence to Sicily, where he remained ten years. While there he published three scientific works in French. Sailing for New York in 1815, he was wrecked on the coast of Long Island, and lost his collections and labors for 20 years. He became a teacher, made a tour to the west in 1818, and was for a time professor of botany in Transylvania university, Lexington, Ky. Finally he settled in Philadelphia, and established in 1832 "The Atlantic Journal and Friend of Knowledge," of which only eight numbers appeared. He published "Annals of Kentucky" (8vo, Frankfurt, 1824); "Medical Flora of the United States" (2 vols. 12mo, Philadelphia, 1828-'30); "The American Nations, or Outlines of a National History" (2 vols. 12mo, 1836); and "A Life of Travel and Researches" (1836). He also wrote many smaller botanical and zoological works, several of which were left unfinished; and he needlessly introduced so many new genera and species as to produce great confusion. "The Writings of C. S. Rafinesque on Recent and Fossil Conchology" has been edited by W. G. Binney and G. W. Tryon, jr. (8vo, Philadelphia, 1864).

RAFN, Carl Christian, a Danish archæologist, born in Brahesborg, island of Fünen, Jan. 16, 1795, died in Copenhagen, Oct. 20, 1864. He was educated at the university of Copenhagen, of which in 1821 he was made an assistant librarian. He undertook a general revision of

all the Icelandic and Norwegian manuscripts yet unpublished, belonging to the collection. Through his exertions in 1825 the "Society for Northern Antiquities" was founded, the principal object of which was to publish those manuscripts which could throw light on the obscure passages of Scandinavian history. It has published many volumes on the history and antiquity of the North. The work which excited the most attention was the *Antiquitates Americanae, seu Scriptores Septentrionales Rerum Ante-Columbianarum in Americæ* (Copenhagen, 1837), prefaced by a summary in English, in which he attempted to prove that the Scandinavians discovered America in the 10th century, and that from the 11th to the 14th they made frequent voyages thither, and effected settlements in what is now Massachusetts and Rhode Island. An important sequel to this work is *Denkmäler Grönlands* (3 vols., 1838-'45). He also published *Antiquités russes* (3 vols., 1850-'54).

RAGATZ, a watering place of Switzerland, in the canton of St. Gall, adjoining Pfäfers, and situated at the junction of several railways and at the mouth of the gorge through which the Tamina flows into the Rhine. It is one of the so-called indifferent thermal springs used for rheumatism and nervous diseases, and the place is generally overcrowded in summer. It has a fine bathing establishment, with terrace gardens to which water is conveyed from Pfäfers in wooden pipes. It contains an English chapel and a monument of Schelling, who is buried in the Catholic cemetery.

RAGLAN, Fitzroy James Henry Somerset, baron, an English general, born Sept. 30, 1788, died in camp before Sebastopol, June 28, 1855. He was the eighth and youngest son of the fifth duke of Beaufort. He was educated at Westminster school, and at the age of 16, being then known as Lord Fitzroy Somerset, entered the 4th regiment of dragoons as ensign. In 1805 he became lieutenant, and in 1809 was attached to the staff of the duke of Wellington as aide-de-camp and military secretary. At Busaco he was wounded, and at the storming of Badajoz he was one of the first to enter the town. At Waterloo he lost his right arm. For these services he was made colonel and knighted. In 1818 and 1826 he was elected to parliament, where he acted with the moderate Tories. In 1852 he was made master general of the ordnance, and created Baron Raglan. In the Crimean war he was commander-in-chief with the rank of field marshal, and on Sept. 20, 1854, fought the battle of the Alma. The sufferings of the troops during the following winter and the disastrous repulse of June 18, 1855, weighed upon his mind, and aggravated an attack of cholera, of which he died.

RAGOTZKY. See RÁKÓCZY.

RAGUET, Condy, an American political economist, born in Philadelphia, Jan. 28, 1784, died there, March 22, 1842. He was of French descent, was educated at the university of Penn-

sylvania, and for 18 months studied law. Afterward entering the counting house of a merchant, at the age of 20 he was sent to Santo Domingo as supercargo of a vessel. There he spent four months, and on his return published "A Short Account of the Present State of Affairs in St. Domingo." After a second voyage to the same island in 1805, when he remained eight months, he published "A Circumstantial Account of the Massacre in St. Domingo." In 1806 he went into business in Philadelphia, and was highly successful. During the war of 1812 he took an active part in providing for the defence of the city. From 1822 to 1827 he resided in Rio de Janeiro, at first as United States consul, and from 1825 as chargé d'affairs to Brazil. After his return to the United States he edited several journals devoted to free-trade doctrines. He published "An Inquiry into the Causes of the Present State of the Circulating Medium of the United States" (8vo, Philadelphia, 1815); "Principles of Free Trade" (1835); and a treatise "On Currency and Banking" (1839), which was republished in England, and translated into French.

RAGUSA (Slav. *Dubrovnik*), a town of Dalmatia, on a small peninsula of the Adriatic, at the foot of Mt. Sergius, 40 m. N. W. of Cattaro; pop. in 1870, 8,678. It has several towers and old walls, and the streets are connected by steps, the principal being the Corso. It is the seat of a Roman Catholic bishop, and has several Catholic and Greek churches. The cathedral, built by Richard Cœur de Lion, contains Titian's "Assumption of the Virgin." The town is strongly fortified and of strategical importance. The number of vessels entering in 1872 was 519, tonnage 12,208. The harbor is small and exposed to the sirocco. The port for larger vessels is at Gravosa, or Santa Croce, 2 m. from Ragusa, where are many fine villas and a new and large ship yard. —Ragusa was founded in the 7th century, after the destruction of Ragusa Vecchia (the ancient Greek colony Epidaurus, now a small village 7 m. S. E. of the present town). In the middle ages it was a republic, and was successively under Greek, Venetian, Hungarian, and Turkish protection. In the 15th century it had a population of 40,000, which declined in consequence of the plague, earthquakes, and the diversion of trade to other places. In 1807 it was occupied by the French under Gen. Lauriston, who soon after stood here a famous siege by the Russians and Montenegrins. Napoleon made Marmont duke of Ragusa, and incorporated it with the new kingdom of Illyria, with which in 1814 it passed to Austria.

RAGUSA, a town of Sicily, in the province of Noto, 30 m. S. W. of Syracuse; pop. in 1872, 21,546. It is built on a steep ridge, and consists of Ragusa Superiore and Ragusa Inferiore, with separate municipalities. In the Capuchin convent are pictures by Novelli. The town has large cotton factories. There are ancient remains, probably of Hybla Minor.

RAHWAY, a city of Union co., New Jersey, on Rahway river, here navigable by small craft, at the head of tide, 5 m. above its mouth in Staten Island sound, 16 m. in a direct line S. W. of New York; pop. in 1870, 6,258. It is a station on the Pennsylvania railroad, and another railroad is in course of construction by the Rahway railroad company to connect with New York and Long Branch. The streets are well laid out, and are lighted with gas. There are numerous fine residences, surrounded by handsome gardens. Water works supply the city on the direct pressure plan, obviating the necessity of fire engines. It is chiefly noted for its extensive carriage factories, of which there are 15 or 20. There are also a printing-press manufactory, two wool-scouring establishments, a manufactory of paper hangings, and some minor establishments. The city contains two national banks, several hotels, five public schools, a male and female institute, numerous private schools, a public library of about 5,000 volumes, two weekly newspapers, and 16 churches.—Rahway was first settled about 1720, and was incorporated as a city in 1858.

RAIKES, Robert, an English philanthropist, born in Gloucester in 1735, died April 5, 1811. He was publisher and editor of the "Gloucester Journal," and in 1781 hired rooms for Sunday schools, employed poor women at a shilling a day to teach, and induced large numbers of the poor children whom he found in the streets of the town to attend. In a short time Sunday schools were established in all the larger towns of England.

RAIL, the proper name of the *rallinæ*, a subfamily of wading birds of the family *rallidæ*. The genus *rallus* (Linn.) is characterized by a bill longer than the head, nearly straight and slender, with the culmen a little curved, and tip obtuse and slightly notched; nostrils in a membranous groove which extends for two thirds of the bill; wings short, with the second and third quills equal and longest; tail short and rounded; tarsi shorter than the middle toe, covered with transverse scales; toes long and slender, free at the base, the hind one short; claws short and sharp; forehead, as in all the subfamily, feathered to base of bill, the culmen parting the frontal feathers for a short distance and in an angle. There are about 20 species, found in all the temperate parts of the globe, resembling each other in habits and much alike in plumage; they inhabit marshes and borders of rivers, among reeds and aquatic plants, which their long toes, sharp claws, and compressed bodies enable them to climb and run over or between with great facility; the flight is awkward and slow, with the legs hanging down, and for short distances only except during migration; they are good swimmers and divers, and very rapid runners. Their food consists of worms, slugs, crustaceans, tadpoles, insects, and leaves and seeds of water plants; the nest is made of

coarse grasses, and placed in retired marshes, and the eggs are 10 to 12. They are very generally called marsh hens, as they resemble domestic fowls in their manner of carrying the head, in some of their habits, and in their cackling notes. The largest of the North Ameri-



Fresh-water Marsh Hen (*Rallus elegans*).

can rails, and one of the handsomest of the genus, is the red-breasted rail or the fresh-water marsh hen (*R. elegans*, Aud.); it is about 18 in. long, the bill 3, and 24 in alar extent, with a weight of about 1½ lb.; the color above is olive brown, with longitudinal stripes of brownish black, especially on the back; throat and lower lid white; neck before and breast rufous chestnut; sides, lower parts, and under tail coverts with transverse bands of brownish black and white; upper wing coverts reddish chestnut, the under black with white lines. It is found in the middle and southern states on the Atlantic coast, probably extending across to the Pacific, and chiefly on the margin of fresh waters; it begins to breed in the southern states about the middle of April in its favorite marshes; the young leave the nest as soon as born. The females are like the males, but smaller; they do not take to the water willingly, and are rather poor divers; the flesh is good, especially in autumn, and their eggs are said to be delicious. The clapper rail or salt-water marsh hen (*R. crepitans*, Gmel.) is about 14 in. long, with an alar extent of 20; the adult plumage is considerably like that of the last species, but the upper parts have a light ashy olive tint, and the neck and breast are more yellowish. It is abundant from New Jersey to Florida, extending also to South America, and is rarely found far from the sea; the nest is deep and funnel-shaped, made of marsh plants and fastened to reeds above the ordinary high tide level; incubation lasts 14 days; the eggs are collected by hundreds in New Jersey toward the end of spring. It is

not a rapid swimmer, but is a good diver, and a very swift runner either on the ground or on floating weeds; its flight is slow and generally straight; though esteemed as food, other species are more sought after, especially the sora, in the middle states. The Virginia rail (*R. Virginianus*, Linn.) is about 10 in. long, with an alar extent of 14; it is like the others in form, and resembles *R. elegans* in color, hardly differing from it except in size. It is found throughout the temperate regions of North America from the Atlantic to the Pacific, most abundantly along the margins of rivers and bays on the Atlantic, migrating south in autumn; it is a very rapid runner and good swimmer, feeding both on salt marshes and fresh meadows by day and night. It breeds from the beginning of March to the middle of June, according to latitude; like the other species it is a good ventriloquist, and seems often to be far off when close at hand; the flesh is good eating in autumn and winter. The European water rail (*R. aquaticus*, Linn.) is fulvous brown spotted with black above, bluish ash below, and barred black and white on the sides. The habits are the same as in other species; the flesh is esteemed, though having rather a marshy flavor.—The genus *ortygometra* (Linn.) has been subdivided into *porzana* (Vieill.) and *crex* (Bechst.). In *porzana* the bill is shorter than the head, the primaries longer than the tertiaries, the tail short, and the legs robust; there are about 20 species in the temperate regions of the globe, with habits similar to those of *rallus*. Among the North American species is the Carolina or sora rail (*P. Carolina*, Cab.), so well known and so abundant as to



Carolina Rail (*Porzana Carolinensis*).

be called "the rail" in the middle states; the length is about 9 in. and the alar extent 14; the color is greenish brown above, with longitudinal lines of black; behind the eyes, sides of neck, and breast bluish ashy, with round white spots on the latter; middle of abdomen

white. It occurs throughout temperate North America on both shores, migrating southward in winter; it is rarely seen east of New York; in autumn it is abundant in the rice fields and fresh-water marshes of South Carolina. It is semi nocturnal; when migrating the flight is low and in compact flocks; instinct teaches them the last moment at which they can remain in autumn, all migrating in a single day or night, whence the once prevalent idea that they dived under the mud to pass the winter. The little black rail (*P. Jamaicensis*, Cab.) is about 6 in. long, the smallest of the North American species of the family; the head and lower parts are slate-colored, nearly black on the top of the head; abdomen banded with white; upper parts brownish black with white stripes, and reddish chestnut on the upper back; the young are wholly bluish black. It is rare on the continent, but more abundant in the West Indies; it is highly prized by collectors. The yellow-breasted rail (*P. Noveboracensis*, Cab.) is about 7 in. long and 13 in alar extent; the color is ochre-yellow above, with brownish black and white stripes; neck and breast tinged with reddish, middle of abdomen white, sides banded with reddish brown and white; under tail coverts rufous, white-spotted, and under wing coverts white. It is found, though not abundantly, in damp meadows in the eastern and southern states; it approaches in habit the corn crane and in some respects the European quail, and was regarded by Audubon as one of the connecting links between land and water birds; the flesh is delicate.—In the genus *crex* (Bechst.) the bill is conical, shorter than the head, and the appearance and habits are like those of gallinaceous birds. (See **CRANE**.)

RAILROAD, or Railway, a road with wooden, stone, or iron sleepers supporting timber or iron ways upon which the wheels of carriages may run. The graduated earthen or stone embankment or cut which supports the road is called the road bed, while the sleepers, rails, &c., constitute the superstructure. Various devices have been employed since wheeled carriages were first used for facilitating their movements, but until modern times these have mostly consisted of levelling and hardening common roads. (See **ROAD**.) Wooden rails were first used as early as 1672 in a short road constructed by Mr. Beaumont at the collieries near Newcastle-upon-Tyne. They were laid exactly straight and parallel, and four-wheeled carts were drawn by horses upon them. Iron rails were first used at Whitehaven, England, in 1738; another iron railway was laid down by John Curr near Sheffield in 1776, but this was torn up by the colliers. In 1786 the first considerable iron railway was built at the iron works of Colebrookdale, and had its origin partly in the low price of pig iron. The upper rails were made of cast iron, 5 ft. long, 4 in. wide, and $1\frac{1}{4}$ in. thick, with holes through which they were spiked to the lower wooden rails or ground-sills; they were cast with a raised lip on the

outer edge to keep the carriage wheels upon the track. The success of this improvement led to its general use in and about mines and collieries, and for many years rails were made altogether of cast iron. These roads were called tramways, and were commonly built as follows: The road bed was brought to as uniform an inclination and level a surface as practicable; squared logs called sleepers or ties about 6 ft. long, 6 or 8 in. wide, and 4 or 5 in. thick, were laid crosswise, 2 or 3 ft. apart; upon these long wooden rails 6 or 7 in. wide and 5 in. thick were notched and pinned, 4 ft. apart and parallel with each other. The iron plates or rails were then spiked to the wooden rails, and the road bed was filled in with gravel, ashes, or coal waste, to form a smooth surface for the horses to walk upon. This is substantially the plan upon which railroads for collieries, quarries, mines, and streets are constructed at the present time. The first iron railway sanctioned by parliament, except a few built by canal companies to bring in the products of adjacent mines, was the Surrey railway, running from the banks of the Thames at Wandsworth to Croydon, which was authorized in 1801. From this time forward the principal improvements in railway construction related to the perfection of the form and materials of the rails and the method of fastening them, and later to the introduction and improvement of steam locomotives and machinery. Cast-iron rails had been laid by Jessop at Loughborough in 1789, without lip or raised edge, but having a smooth upper surface, upon which the carriages were kept by means of flanges on the wheels; these were called "edge rails," and were set in cast-iron chairs, which rested upon the wooden sleepers. Edge rails of oval section, with the longer axes vertical, were again used in 1801 at the slate quarries of Lord Penrhyn; they were $4\frac{1}{2}$ ft. long, and each end terminated by a pyramidal or wedge-shaped block, which rested upon and fitted into an iron sill. The carriage wheels were hollowed out to fit upon the convex surface of the rails, but as this device increased the friction by increasing the bearing surfaces, the surfaces of both rails and wheels were afterward made flat, and the wheels were made with flanges to keep them on the rails. By the use of these improvements it was found that one horse could do the work of 40 on a common road; they were rapidly adopted by the colliers, and in the north of England still further improvements were made in the form of the rails, with the view of increasing their strength without decreasing their weight. They were made still thinner, the oval cross section verging toward the pear shape, with the thicker part at the top, while the longitudinal section was straight on the top and curved downward on the bottom, the greatest depth of the rails being midway between the ends; those of this form were known as "fish-bellied" rails, and were used for some years after the introduction

of wrought-iron rails. This took place in 1808, though it was not till 1820 that suitable machinery was devised for rolling rails into other than flat shapes. This was a most important step, as cast-iron rails could not be made straight in greater lengths than 4 or 5 ft., and consequently required many cross ties and joints; whereas the introduction of wrought iron permitted the increase of the length of the rails by successive steps, till with the perfected processes of the present day they are made of iron and steel 30 ft. and even longer if required. With the improvements in the machinery for rolling rails, it became possible to make the new and improved forms of rails rendered necessary by the substitution of steam carriages for horses, which had hitherto been almost exclusively used. The force of gravity was utilized in exceptional instances where the roads sloped gradually from the collieries, and by the adaptation of ropes and wheels or windlasses the descending loaded cars were made to draw up the empty ones.—

Watt suggested the possibility of constructing steam carriages in 1759, and patented one in 1784. Oliver Evans of Philadelphia patented a steam wagon in 1782, the drawings and specifications of which were sent to England in 1787, and again in 1794-'5. In 1784 Murdoch, Watt's assistant, constructed a working model of Watt's carriage. In 1802 Trevithick and Vivian patented a high-pressure locomotive engine, and in 1804 built one for the Merthyr-Tydfil railway in S. Wales, which was found to work well with light loads upon a level surface or moderate grades, but if more severely tasked the wheels would slip without advancing. A check was thus put upon their use until some method could be devised by which they might obtain a hold upon the track or otherwise push themselves forward. A rack laid along the side of the rail, into which worked a toothed wheel fitted to the locomotive, was tried in 1811 on a colliery line near Leeds, but the friction was too great, and it was abandoned. The next year engines were tried with eight driving wheels for securing the required adhesion; and about the same time other engines were constructed with levers projecting behind and working alternately like the hind legs of a horse. In 1814 and 1815 engines with plain wheels were found to work successfully on some of the northern roads; but no other application was made of them than for transporting the coal and ore wagons of the mines. In 1814 George Stephenson constructed his first locomotive, which travelled at the rate of 6 m. an hour; in 1826 Seguin, a French engineer, built locomotives in which he increased the evaporative power of the engine by small tubes passing from the fire box to the chimney; in 1829 Stephenson and Booth built the engine Rocket, weighing 4 tons 5 cwt., which travelled at a rate of 35 m. an hour; in 1834 the Firefly drew a loaded train at the rate of 20 m. an hour; in 1839 the North

Star moved with a velocity of 37 m. an hour; and at the present time locomotives have attained a speed of 75 m., and for short distances even greater velocities have been reached. (See STEAM CARRIAGE.)—The first railroad for carrying passengers was the Stockton and Dar-



First Railroad Passenger Car.

lington road, built by Edward Pease and George Stephenson, and opened Sept. 27, 1825. The Liverpool and Manchester road, commenced in 1826, and opened Sept. 15, 1830, was intended by its proprietors to carry passengers at a high speed. As it would be expensive to do this with horses, it was thought that stationary steam engines placed at short intervals along the road might be used for the purpose of drawing the trains; but the success of the locomotives built by Stephenson, Ericsson, and others, under the stimulus of a premium of £500 offered by the railway company, caused this plan to be abandoned, and gave rise to the establishment of a new system of locomotion of almost limitless speed and capacity. The small engines at first used were soon found inadequate to the service demanded of them, and were replaced by others of larger size and greater weight; some now employed have 10 or 12 wheels and weigh in some cases as much as 75 tons, and there are many in all parts of the world weighing 30, 40, and 50 tons, according to their pattern and uses. Finally, owing to the great weight and high speed of these locomotives, and the consequent wear and tear upon themselves and the rails, joints, and bridges, it has come to be a grave question as to whether they have not grown beyond the limit of economy, and should not therefore be reduced in size and weight. The gauge of the Liverpool and Manchester railway was fixed by Stephenson at 4 ft. 8½ in., that being about the common gauge of the ordinary road wagons of the day. It was afterward generally adopted throughout the world, partly for the same reason that influenced Stephenson, but mostly because the English were the first locomotive builders for foreign countries, and stoutly adhered to the precedent set them by their most distinguished engineer. Later the merit of this precedent was disputed by Brunel and other able engineers, who claimed that a broader

gauge would give greater speed, safety, and economy; and roads of 5 ft., 5 ft. 5 in., 6 ft., and even of 7 ft. gauge were built. But the wider gauges are gradually losing favor, and have generally been abandoned for the 4 ft. 8½ in. (or the 4 ft. 9 in.), now commonly called the standard gauge. It has come to be contended by many engineers, and notably by Mr. Fairlie of England, that even the standard gauge is too wide, and that gauges of 3 ft. and less are still more economical. The success of the Liverpool and Manchester railway led to the projection of new roads in England, chiefly in the northern part, connecting together its principal cities; but the capacity of the locomotive was not yet fully developed or appreciated, and upon most of the roads it was considered necessary to overcome the heavier grades by the use of stationary engines. These and also inclined planes were gradually dispensed with, and tunnels were substituted for the purpose of reducing the grades and curvature, both of which were brought to a minimum by the expenditure of large sums of money. As a measure of safety, the most important roads in England were from the first built with double tracks; but this practice was not followed in America till the traffic on the various lines had become so great as to render it absolutely necessary.—The first railroad constructed in America was projected by Gridley Bryant, a civil engineer, in 1825, and carried through by himself and Col. T. H. Perkins in 1826. It was designed to carry granite from the quarries of Quincy, Mass., to the nearest tide water, and is known as the Quincy railroad. It is 4 m. long including branches, and its first cost was \$50,000. It was laid to a 5 ft. gauge, and was constructed as follows: Stone sleepers were laid across the track 8 ft. apart; upon these wooden rails 6 in. thick and 12 in. high were placed; upon the top of these rails wrought-iron plates 3 in. wide and ½ in. thick were spiked, but at all the crossings of the public road and driftways stone rails were used, and as the wooden rails decayed they were replaced by others of stone. This road was supplied with the first turn-table ever used, which was designed by Bryant and is said to be still in good order. Bryant also invented the portable derrick and the switch or turnout, and constructed the first eight-wheeled car ever used, by combining two four-wheeled trucks for hauling long pieces of granite intended for columns; and although a more complete application of the principle was afterward made by Ross Winans of Baltimore in the construction of eight-wheeled cars used on the Baltimore and Ohio railroad, the latter was unable to sustain his patent by law against the claims of others in Bryant's behalf. Winans began his experiments in 1830, with the view of designing a carriage which would easily traverse the short curves of the railroads then under construction, and ultimately produced the eight-wheeled or double bogie carriage, which is now

in use throughout the United States and Canada, and is being introduced upon the Pullman carriages into Europe. The second American railroad was laid out in January, 1827, and opened in May of the same year from the coal mines of Mauch Chunk, Pa., to the Lehigh river, and with turnouts and branches was 13 m. long. This was also of 5 ft. gauge, with timber sleepers and rails, strapped with flat iron. It was operated by gravity, though the length of the road was so great that mules had to be used for returning the empty cars to the mines. The Delaware and Hudson canal company sent Horatio Allen to Europe in 1827 to buy three locomotives and the iron for a railroad, which they built the next year from the coal mines at Honesdale to the terminus of their canal. One of the locomotives, built by George Stephenson at Newcastle-upon-Tyne, arrived at New York in the spring of 1829. Another, built by Foster, Rastrick and co. of Stourbridge, arrived shortly afterward, and went upon the railroad in the latter part of the summer. This was the first locomotive actually put into use in America. It had four wheels, a multitubular boiler, and the exhaust steam blast. In March, 1827, the legislature of Maryland granted a charter, modelled upon the old turnpike charters, to the first railroad company in America authorized to carry on the general business of transportation; its capital stock was \$500,000, with permission for its increase, and both the state of Maryland and the city of Baltimore were authorized to subscribe to its shares. In the beginning no one dreamed of using steam upon the road; horses were to do the work, and even after the road was completed to Frederick relays of horses moved the cars from place to place. From this circumstance the Relay House, at the junction of the main line and the Washington branch, took its name. This great highway, now known as the Baltimore and Ohio railroad, was begun July 4, 1828, and was gradually extended along the valley of the Patapsco 13 m. to Ellicott's Mills, thence to the Potomac at the Point of Rocks, thence along the valley of the Potomac to the Cumberland coal region, and finally across the Blue Ridge and Alleghany mountains to the Ohio river at Wheeling, with a branch toward Parkersburg in the direction of Cincinnati. At Wheeling and Parkersburg it now connects with other railroads owned or controlled by the same company, leading to Cincinnati and St. Louis, and also to Pittsburgh, Cleveland, and Chicago. In 1830 a small locomotive was built in Baltimore by Peter Cooper (now of New York), who was satisfied that steam engines might be adapted to the curved roads which would have to be built in America. He also believed that the crank could be dispensed with in the change from a reciprocating to a rotary motion, and designed his engine to demonstrate both conclusions. The boiler, which stood upright, was not so large as the ordinary boiler attached to the range of a modern man-

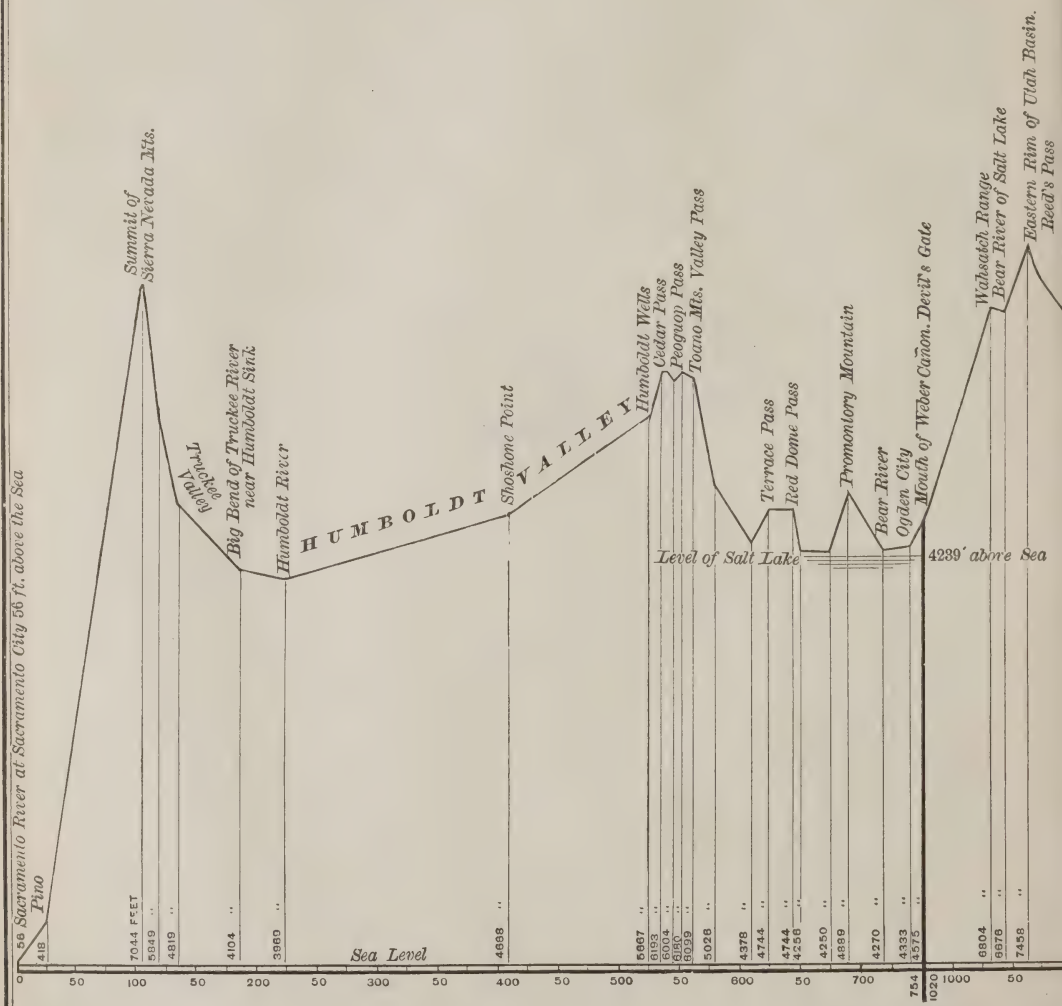
sion; the cylinder was $3\frac{1}{2}$ in. in diameter, and connected with the wheels by a system of gearing. The whole engine could not have weighed over a ton, but with it he drew an open car filled with the directors of the road and some friends, at a speed which reached 18 m. an hour, from Baltimore to Ellicott's Mills. This was the first locomotive for railroad purposes ever built in America, and the first one used in the transportation of passengers on this side of the Atlantic. This railroad was originally built with stone and wooden cross ties, and wooden rails strapped with flat bars of iron $\frac{1}{2}$ and $\frac{5}{8}$ in. thick, and from $2\frac{1}{2}$ to $4\frac{1}{4}$ in. wide. The bars were fastened down by spikes, the heads of which were countersunk into the iron. This method was generally adopted upon the early American railroads, but was soon found to be defective and dangerous. The oscillation and balloting of the engines and cars caused the ends of the rails to work loose, thus making what came to be known as "snake heads," and these were caught up by the wheels and thrust upward through the bottom of the cars. The successful use of locomotives in Europe and America gave an extraordinary impulse to the construction of new lines of railroad upon the principal routes of intercommunication. Charters for railroads were obtained in Massachusetts, New York, New Jersey, Pennsylvania, Maryland, and other states. Operations were begun in South Carolina in 1829 upon a railroad designed to connect Charleston with the Savannah river, six miles of which were completed and opened in the same year. The company having this work in charge, under the advice of their engineer, Horatio Allen, who had gone to England to examine the railways of that country, determined to operate their road by the exclusive use of locomotives, and offered a premium of \$500 for the best plan of horse locomotive. This was awarded to C. E. Detmold, civil engineer (now of New York), who designed and constructed an engine run by a horse walking on an endless platform, which carried passengers at the rate of 12 m. an hour. The same gentleman in the winter of 1829-'30 made the drawings of the steam locomotive *Best Friend*, designed by E. L. Miller of Charleston, which was built by the Kembles of New York and placed on the Charleston railroad late in the summer of 1835. This railroad was the first to use the important arrangement of two four-wheeled trucks or bogies for engines and passenger cars. As before stated, this arrangement was practically wrought out by Bryant on the Quincy railroad in hauling large masses of granite, and was experimented upon and finally in 1834 patented by Ross Winans, but seems to have been first put into efficient use in accordance with designs made by Horatio Allen in 1830. The eight-wheeled double bogie carriage was first used upon the Baltimore and Ohio road in 1834, and was built from the designs of Winans. In August, 1830, the Mohawk and Hud-

son railroad, from Albany to Schenectady, was begun; in October, 1831, it was carrying 387 passengers a day; and in 1832 a locomotive with a load of eight tons travelled on it at the rate of 30 m. an hour. Various railroads in the Pennsylvania coal region and the Baltimore and Susquehanna railroad were begun in 1830. The railroad from Richmond to the coal mines, 13 m. distant, was finished in 1831; and on April 16 of the same year the New Orleans and Pontchartrain railroad, $4\frac{1}{2}$ m. long, was opened. From this time forth railroads were multiplied with great rapidity. In 1832 it is stated that 67 were in operation in Pennsylvania alone; and in that year several of the most important railroads in Massachusetts and New Jersey were begun. Indeed, so great was the enterprise throughout the United States from 1832 to 1837 in the projection and construction of railroads, that at the end of that period the completed lines exceeded in number and aggregate length those of any other country. Since then, with occasional interruptions arising from financial crises and the civil war, the multiplication of railroads has kept pace with the extraordinary increase of population and wealth; and now the mileage of railroads in this country is more than four times as great as in Great Britain, and far in excess of that of all the rest of the world. The American railroads have however grown up under the requirements of the various regions, and have been planned, constructed, and fostered in a great measure independently of each other and without regard to any great or national system. The charters in nearly every instance were granted by the respective states for the roads in their own territory, so that most of the through lines connecting the great cities and widely separated regions of the country grew up by the consolidation of various short sections of road into continuous lines under one management, or by the longer and more prosperous roads leasing the shorter and poorer ones, and only occasionally by agreement of connecting roads to coöperate with each other in the arrangement of their trains. To the absence of national control over the construction of railroads is due the fact that no uniform gauge for the American system was adopted. Every state, and in fact nearly every company, was left free to fix its own gauge and decide upon the character of its own roads. The gauge of 4 ft. $8\frac{1}{2}$ in. first used in English locomotives was generally continued for the sake of convenience even after the locomotives came to be exclusively built in this country, but independent gauges were also introduced. The Ohio and New Jersey railroads generally adopted 4 ft. 10 in., which in connecting with the roads of the standard gauge necessitated the use of cars with the trucks adjusted to the narrower gauge, but having wheels sufficiently wide to run upon the wider gauge. These were called "broad tread" wheels, and the cars "compro-

mise cars." The railroads of the southern states, with only a few exceptions, were laid to a 5 ft. gauge; two in Ohio to 5 ft. 4 in.; several in Maine, Missouri, and Canada to 5 ft. 6 in.; while the Erie, the Atlantic and Great Western, and the Ohio and Mississippi were laid to the 6 ft. or "broad gauge." The last named road changed to the gauge of 4 ft. 9 in. in 1870, the work of moving in both rails having been completed in a single Sunday without the stoppage of trains or the slightest derangement of business.—Notwithstanding the original absence of system and national control, many important continuous lines have been developed by the consolidation of independent ones, and the construction of others necessary to connect or extend the various parts of the trunk lines. The first great lines of this character originated in the desire of the great seaboard cities to secure a larger share of the business from the interior and western states. The railroad from Boston to Albany, the New York Central, the Erie, the Pennsylvania Central with its eastern and western connections, and the Baltimore and Ohio, are the most notable instances illustrating the peculiar method by which the great trunk railroads have been created. The Atlantic and Great Western, the Toledo, Wabash, and Western, the Chicago and Northwestern, the Cleveland, Columbus, Cincinnati, and Indianapolis, the Michigan Central, and many others of equal or less extent, grew up in a similar manner. The money for carrying out these vast improvements was in general raised by private subscriptions to the share capital, supplemented by loans secured by mortgages upon the property created; in many instances, however, towns, cities, and even states subscribed to the capital stock, or lent their credit to the various companies. In 1848 the Mobile and Ohio railroad, designed to connect Mobile with the mouth of the Ohio river, was projected, and in the winter of 1849-'50 congress passed an act giving to that undertaking about 1,000,000 acres of the public lands lying contiguous to the route. This was the first act of the kind, and was soon followed by a grant of 2,595,000 acres to the state of Illinois, which conveyed it to the Illinois Central railroad company, for the purpose of aiding it to construct its road from Dunleith on the Mississippi river, in the N. W. corner of the state, to Cairo, 455 m., with a branch from Centralia to Chicago, 249 m. By the hypothecation and sale of these lands and the mortgage of its railroad, the company secured the means of completing its lines, and, with the exception of embarrassments during its earlier days and before the country along the road had become sufficiently developed to yield an adequate traffic for its support, this has been one of the most successful railroads of the country. The policy of granting public lands to railroad companies gave an extraordinary development to railroad enterprise in the northwestern, west-

ern, and southern states, which, aided by their great fertility and other natural resources, soon surpassed the older states in the length and number of their lines.—*Pacific Railroads.* The discovery of gold in California and the rapid increase of wealth and population in the territory west of the Rocky mountains, together with the desire of the older states to establish closer connections during the civil war with those outlying communities, caused congress in 1862 to authorize the construction of a railroad to the Pacific ocean, with various branches to connect it with rival towns on the Missouri river. This project was first brought into public notice by Mr. Asa Whitney, who from 1846 to 1850 advocated it in addresses to state legislatures and before public meetings, and memorialized congress on the subject. The idea was strongly advocated by Senator Breese of Illinois and by many other men of distinction both in and out of congress; but the plan first took tangible shape in the bill introduced by Senator Benton of Missouri, Feb. 7, 1849. In March, 1853, an act was passed providing for surveys by the corps of topographical engineers of the various routes, and particularly of a northern, southern, and middle one, with the view of determining which offered the greatest advantages for the construction of the railroad. These surveys resulted in the decision that the enterprise could be carried through upon either route which might be adopted; but owing to dissensions and rivalry between the northern and southern states, nothing further was done by congress till the war had removed this obstacle. Acts of congress were passed in July, 1862, and in July, 1864, providing for a subsidy in United States 6 per cent. gold bonds at the rate of \$16,000 per mile of railroad from the Missouri river to the base of the Rocky mountains, \$48,000 per mile for a distance of 300 m. through the mountains, \$32,000 per mile for that portion between the Rocky and Sierra Nevada mountains, and \$16,000 per mile for that west of the latter mountains. In addition to this subsidy, the same acts of congress gave to the railroad companies undertaking this great work 20 sections (12,800 acres) of land for each mile of railroad built, or about 25,000,000 acres in all. The first act of congress provided that the government subsidy of bonds should constitute a first lien upon the road and its appurtenances, but it was found that the money arising from the subsidy would not secure the completion of the work. Congress therefore released the first lien of the government, and empowered the railroad companies to issue their own bonds or debentures at the same rate per mile, and to secure their payment by a first mortgage upon their property. The railroad was built from the California end eastward by the Central Pacific railroad company, and from the Missouri river westward to the common meeting point at Ogden by the Union Pacific company. Work was commenced in 1863, but it was not till

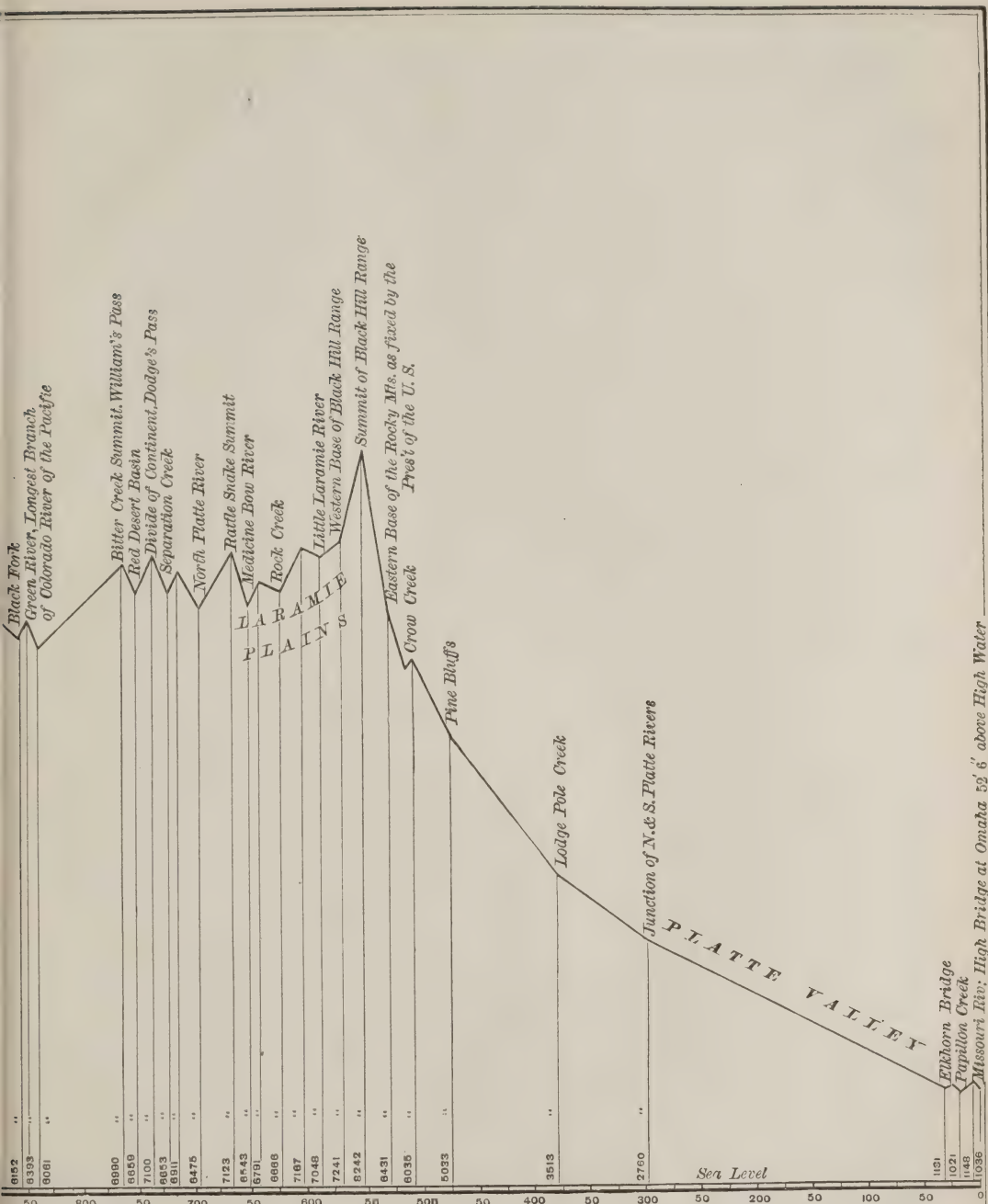
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CENTRAL PACIFIC R. R.

PROFILE OF THE



UNION PACIFIC R. R.

PACIFIC RAILROAD

VOL. XIV.—12

824,821, or an average of about \$35,000 a mile, and this cannot have been far from correct. The cost of the Central Pacific railroad and branches, 1,222 m., in stock, bonds, and liabilities of every sort, was reported in 1874 at \$139,746,311, or an average of \$114,358 a mile. The Northern Pacific railroad company was chartered by congress in 1864, and subsidized, to construct a railroad from Lake Superior to Puget sound, 1,800 m., with a branch of 200 m. *via* the valley of the Columbia river to Portland, Oregon. The construction of the road was begun in 1870, but was arrested in 1873 by financial difficulties. In 1875 there were in operation 450 m. from Duluth, Minn., to Bismarck, Dakota, and 105 m. between Kalama and Tacoma in Washington territory. The Texas and Pacific railroad is to extend from Shreveport, La., and Texarkana, Ark., *via* El Paso, to San Diego, Cal., a distance from Shreveport of 1,514 m. In 1875 the main line was in operation from Shreveport to Dallas, Texas, 189 m.; also the division between Texarkana and Marshall on the main line, 75 m.—*Railway Statistics.* Details in regard to railroads are given in the articles on the various states and countries. The following tabulated statement from Poor's "Manual" shows the number of miles of road constructed in the United States each year since 1830:

YEAR.	Miles in opera- tion.	Annual increase, miles.	YEAR.	Miles in opera- tion.	Annual increase, miles.
1830.....	28	..	1853.....	15,360	2,452
1831.....	95	72	1854.....	16,120	1,860
1832.....	229	134	1855.....	18,374	1,654
1833.....	880	181	1856.....	22,016	3,647
1834.....	633	253	1857.....	24,503	2,647
1835.....	1,098	465	1858.....	26,968	2,465
1836.....	1,273	175	1859.....	28,789	1,821
1837.....	1,497	224	1860.....	30,685	1,846
1838.....	1,913	416	1861.....	31,286	655
1839.....	2,302	389	1862.....	32,120	834
1840.....	2,818	516	1863.....	33,170	1,050
1841.....	3,535	717	1864.....	33,908	738
1842.....	4,026	491	1865.....	35,085	1,177
1843.....	4,185	150	1866.....	36,827	1,742
1844.....	4,377	192	1867.....	39,276	2,449
1845.....	4,633	256	1868.....	42,255	2,979
1846.....	4,980	297	1869.....	47,208	4,953
1847.....	5,598	698	1870.....	52,898	5,690
1848.....	5,996	898	1871.....	60,566	7,670
1849.....	7,865	1,369	1872.....	66,735	6,167
1850.....	9,021	1,656	1873.....	70,658	3,943
1851.....	10,982	1,961	1874.....	72,623	1,940
1852.....	12,908	1,926			

Population (estimated).....	42,219,000
Area in square miles, exclusive of those territories which have no railroads.....	2,492,316
Miles of railroad.....	72,623
Number of inhabitants to a mile of railroad.....	581
“ of square miles to a mile of railroad.....	84.4
Capital stock.....	\$1,990,997,456
Funded and other debt.....	\$2,230,766,108
Total capital account.....	\$4,221,763,594
Cost of railroad per mile.....	\$60,425
Receipts, total.....	\$520,466,016
“ from passengers.....	\$140,999,081
“ “ per cent. to total.....	27.1
“ from freight.....	\$347,016,874
“ “ per cent. to total.....	66.8

Percentage of total receipts to total capital and debt.....	12.3
Receipts to each mile of railroad.....	\$7,344
" to each inhabitant.....	\$12 32
Operating expenses.....	\$330,595,058
Percentage to receipts.....	68.6
Net earnings.....	\$189,570,958
Percentage to receipts.....	36.4
" to total capital and debt.....	4.5
Dividends paid.....	\$67,042,942
Percentage of dividends to capital stock.....	8.37

The total mileage of railways in the United Kingdom has increased from 8,335 m. in 1855 to 13,289 in 1865, 15,376 in 1871, and 16,082 in 1873. Of the mileage in 1873, 11,369 m. were in England and Wales, 2,612 in Scotland, and 2,101 in Ireland. The authorized capital for the United Kingdom in 1873 was £676,686,586, of which £588,320,308 was paid in. The total receipts amounted to £57,742,000, including £31,821,529 from freight, £28,853,892 from passengers, and £2,066,579 from rents, tolls, &c. The working expenditures were £30,752,848, and the net receipts £26,989,152. In 1874 the Dominion of Canada had 4,099 m. of railway. The length of railways in operation in the chief countries of the European continent in or about 1872 was as follows:

	Miles.
Austria, Cisleithan (1870).....	3,724
Baden (1870), constructed by the state.....	580
Bavaria, constructed by companies.....	609
" " by the state.....	1,221
Belgium, constructed by companies.....	1,042
" " by the state.....	962
Denmark, constructed by companies.....	166
" " by the state.....	374
France (1870).....	10,847
Hesse.....	246
Holland, constructed by companies.....	429
" " by the state.....	614
Hungary (1870).....	2,151
Italy.....	4,087
Norway, constructed by companies.....	42
" " by the state.....	265
Portugal (1870).....	439
Prussia, constructed by companies.....	4,733
" " by the state.....	3,918
Russia (1874).....	10,725
Saxony (1870), constructed by companies.....	140
" " by the state.....	597
Spain (1870).....	3,380
Sweden, constructed by companies.....	461
" " by the state.....	737
Total.....	52,424

—*Railroad Management.* The policy of governments and countries in respect to the construction of railroads at first differed as widely as the countries themselves, but now there may be said to be only two systems, the English and the French. In England and the United States the initiative is given by private enterprise, and the entire control of operations is exercised by joint-stock companies, through their officers or agents, subject only to the laws regulating and defining their powers. In France, Germany, Russia, and most countries of continental Europe, everything connected with railroads and other public works is organized on a systematic plan and conducted with complete uniformity. In England and America everything is left to experience, and no fixed practice or general principle exists. Government plays an insignifi-

cant part; when it has authorized the construction of a railroad and defined the powers of the company having it in hand, it goes no further. In France and most other countries the executive government determines the localities for which railway communication is to be provided, lays out the line, chooses the company which is to make the road, or if no company offers makes it itself, regulates the number of trains, fixes the tariffs, controls the administration, and in short attends to the minutest details of construction, maintenance, and operation. The point of principal importance in the comparison of the English and French railway systems is that, setting out with different policies—private enterprise and free competition on one side, state control and monopoly on the other side—both have ended in the division of the two countries among a few great companies, and the consequent triumph of monopolies. Starting from diametrically opposite principles, the two contrary systems have reached nearly similar results. The construction of railways as a whole has been as rapid in France as in England; their mileage is nearly equal, with not very different fares and nearly the same number of passengers and tons of freight per mile; while in the United States the mileage is nearly five times as great as in either France or England, though the aggregate cost of the railroads in each of the three countries is nearly equal. In America the tendency is toward amalgamation and monopoly. The richer companies are gradually absorbing the weaker ones, and yet so far the general result has been to cheapen transportation and give the public greater and better facilities. In some instances consolidations have taken place to such an extent that the public has become alarmed, and efforts have been made, especially in Massachusetts, Wisconsin, and Illinois, through the agency of boards of railroad commissioners, to exercise such control over the railroad system of the respective states as to properly harmonize the interests of the public and the companies. Many of the state legislatures have undertaken to equalize and control the fares and rates of freight by arbitrary enactments, while others have endeavored to do so through their boards of commissioners. As yet no practical settlement of the various questions has been reached. The railroad companies make the general claim that their charters are contracts with the state, which authorize them to regulate their own charges and control their own business, and which cannot be altered or amended directly or indirectly without their consent; and finally that all efforts to do so are in contravention of the constitution of the United States, which prohibits the states from making laws impairing the obligation of contracts. The theory of those who assert that the states have the right to regulate the rates at which passengers and freights shall be carried by railroads, is that they are public highways, controlled by

corporations created by law, and therefore subject to the law-making power whenever it may choose to intervene. Still another theory has been set up and received public attention, namely, that the authority to regulate commerce between the states, given to congress by the constitution of the United States, is broad enough to cover and does cover the right to regulate and control the railroads in all matters pertaining to their operation, and particularly in fixing the rates at which freights and passengers shall be carried, notwithstanding the fact that railroads for commercial purposes were at the time of the formation of the constitution entirely unknown and unthought of. What will be the future solution of this question, now receiving the attention of many writers and thinkers in all parts of the world, cannot be predicted. In France and other countries, where a system of monopolies was deliberately established by the government, a system of checks has been or can be established in the interest of the public. In England the purchase of the railways by the state has been urged by an influential party, on the ground that the state is the only power which can properly control an interest so great and which so vitally affects the welfare of the entire nation; and in Belgium such purchase is gradually being made by the government. From the peculiar nature of our institutions, as well as from the complexity and extent of our railroad system, the regulation of railroads by government is much more difficult, and therefore probably much more remote, than it is in Europe. On the other hand, the difficulty of consolidation and combination, owing to the extent of the country and the diversity of interests, is also greater, while the danger of monopolies is less; and hence the question will probably receive a solution in America founded upon competition.—*Construction and Rolling Stock.* Before deciding upon the construction of a railroad along a given route, a careful calculation of the amount of transporting business already done on the route should be made, with the view of ascertaining whether it is sufficient to justify the proposed railroad; though estimates of this kind have in general been found to afford a very uncertain indication of the amount of business which the railroad itself when constructed would obtain. A more enlarged estimate should be made of the extent of country tributary to the proposed railroad, together with its mineral and agricultural resources, developed and undeveloped, its wealth and population, and also the influence of the new route of transportation upon those already established, as well as upon the habits and productions of the people who are expected to use it. The first question to be considered is, Will any kind of railroad pay when built? the second is, What kind of a railroad, all things considered, should be built? and the third is, Where and how can the money be got to pay

for it? In one region a double track steel railway, with low grades, slight curvature, iron bridges, brick or stone station houses, and the largest and best rolling stock, all costing \$100,000 more or less per mile, may be necessary to accommodate the business; in another case, a single track, with heavier grades and sharper curvature, wooden bridges, and cheaper appurtenances of every kind, may be sufficient; and in still another case lighter rails, narrower gauge, and still lighter rolling stock and machinery, may prove to be more than is required. No rule can be given for telling beforehand just what kind of a railroad should be built, or, when built, will prove to be the one best suited to the situation. Such questions are necessarily indeterminate. It is however a safe principle, economically considered, that no more expensive railroad should be built over any route than can be paid for out of the money which the people to be benefited by it will subscribe to the company's stock or lend upon the pledge of its mortgage bonds. This rule has not generally been kept in view in the United States and other new countries, and the consequence is that there has been a great over production of railroads at various periods, and particularly between 1863 and 1873. To such an extent has this over production gone that the financial panic of October, 1873, has been attributed by some writers exclusively to this cause.—Preparatory to the construction of a railroad, surveys are made along the several routes the road may follow, and plans are constructed representing the exact distances and grades or the amount of deviation from a level at all the points. From these plans the amount of excavation and embankment, of tunnelling, bridging, &c., necessary to bring the road within the required degree of straightness and level, are calculated. Thus the estimates are obtained, by comparison of which, including also the ascertained amount to be paid for right of way, the construction of the road is determined. The importance of the road and the special purpose for which it is designed are to be duly considered in deciding upon saving of distance and reduction of grades by heavier expenditures. Roads upon which numerous trains are to pass daily, each one of which will incur a certain additional expense for every additional mile, and each mile will involve a certain annual expense for keeping in repair, may economically be shortened by increased outlays that would be entirely inadmissible in securing a similar reduction of distance for less travelled routes. So upon roads that are to be run at high rates of speed short curves must be avoided at any expense. It has happened, from the experience gained in the working of railroads, that some of the earlier lines have been economically reconstructed by a partial abandonment of the old routes under more judicious surveys, or from the increase in the business justifying the adoption of a more perfect line. As already

remarked, the old system of occasional inclined planes is almost wholly abandoned for roads of general travel, and the construction and capacity of locomotives and carriages are so much better understood, that a much greater range in curvatures and grades is now found practicable than was formerly ever thought of. As regards curves, it was at first recommended in England to fix the minimum radius that should be allowed at one mile, and in 1846 it was one of the "standing orders" of parliament that no curve should be made with a radius of less than half a mile (2,640 ft.) without special permission of parliament. In France a minimum was established by "the administration of roads and bridges" of 2,700 ft., or about 2° . On the Hudson River railroad the minimum curve has a radius of 2,062 ft. $= 2.75^\circ$. But the Baltimore and Ohio road was built with several curves of 400 ft. radius (14.25°), and with one of 318 ft. (18°), and no difficulty was experienced in running over them at 15 m. an hour. The narrow-gauge railroads now coming into favor for light traffic, in thinly settled or mountainous districts, are built with curves of very much shorter radius, in some instances not exceeding 50 ft. in length. The objectionable features of the curves are avoided by making the wheels conical, of greater diameter within than at their outer edge; the effect of this in running on a curve, when the wheels on the outer side are pushed by the centrifugal force outwardly, is to make them roll on their larger diameter, and at the same time the wheels on the other side, drawn in toward the centre of the track, roll on their smaller diameter. On each side they are thus accommodated to the different lengths they have to traverse, without straining the axles and without greatly increased friction or slipping of the inner wheel upon the rail. The friction against the outer rail due to the centrifugal force is partially prevented by elevating the outer rail. The object of attaching the wheels to their axles, instead of letting them turn upon these, is to secure greater steadiness at high speed. The requiring of minimum degrees of curvature has been abandoned upon the English and French roads. In France, upon the Paris and Orsay and Paris and Sceaux railroads, there are curves of 82 ft. radius, and trains, the engines and carriages of which are provided with loose wheels and guide rollers, run through complete semicircles at 20 m. an hour.—Upon the earlier roads in Great Britain and in the United States grades of 30 or 40 ft. to the mile were considered heavy, at the last figure nearly tripling the power that was required to draw the load upon a level. Grades of 70 to 80 ft. were regarded as almost impracticable, as they would compel the carrying of light loads over the whole line, and therefore, when such grades could not be otherwise avoided, inclined planes worked by stationary engines were adopted. The Hudson and Mohawk railroad, in a length of 16 m., was built with one such plane at

Albany, and another at Schenectady. The Philadelphia and Columbia railroad was also built with two planes, one at Columbia and the other near Philadelphia, and there were ten on the Alleghany Portage road over the Alleghany mountains, all of which have been displaced by the substitution of heavier grades on more extended lines. But as experience was acquired in the working of railroads, it was found that locomotives rarely carried maximum loads for the moderate grades, and that a temporary slackening of the speed upon the steep grades rendered a further portion of the power of the locomotive available for overcoming the increased resistance. Thus, when the doubtful point as to the adhesion of the driving wheels to the rails was satisfactorily determined, and the common law of mechanics, that power can be gained at the expense of motion, was found to be applicable to ascending grades of a railroad, these were increased much beyond their former limits. High grades were sooner introduced in this country than in Europe, but they have since been adopted there also. On the Mount Savage and George's Creek railroads in Maryland grades of 140 ft. to the mile have long been used; and on the Baltimore and Ohio road, through the Alleghany mountains, of 114 ft. In England those of 100 ft. to the mile are not uncommon, and there are several from 130 to 150 ft. At Sheffield is a grade of 196 ft. to the mile, and the same is seen at Oldham on the Lancashire and Yorkshire road, extending for $1\frac{1}{2}$ m. In France on the St. Germain railroad is a grade of 123 ft. to the mile for about $1\frac{1}{2}$ m.; and it is now asserted by engineers that grades of 370 ft. to the mile can be worked by locomotives, but that on heavy grades the locomotive should take no more cars in descending than in ascending.—The proper preparation of the road bed should be an object of the most particular care. Being the foundation and support of the whole superstructure, it should as a matter of economy be made as firm and durable as possible. But it is in this that the American roads are most defective. The least width of embankments for double tracks ought not to be less than the width of the two tracks, with 6 ft. between them, and 6 ft. outside of each. In excavations the width of ditches on each side should be added. A common width of embankments in England is 33 ft., while on the principal American roads it varies with the height of the embankment. The transverse slopes of the English roads are much flatter than ours, and are commonly well protected with a good grass sod. But the most essential difference is in the drainage, upon which more than anything else depends the durability of the earthwork and of the sleepers and rails. Upon some American roads the sleepers are laid directly upon the natural soil, or upon this thrown up in a bank. Where the ground freezes, any superstructure on such a basis is certain to be more or less displaced in

the spring thaws; in wet weather it must prove very insecure, and in dry weather very dusty. The sleepers soon settle irregularly, placing the rails out of line, and thus are involved rapid wear, deterioration, accidents, and loss to the rolling stock and to the road. The dust rises in clouds, to the great injury of the machinery and of the passenger cars, and seriously incommoding the passengers themselves. The effects of water about the earthwork of railroads are regarded as so injurious that an eminent English authority says: "Wherever it is known or suspected to exist, its immediate source should be traced, and every possible means adopted for diverting it from the slopes and adjacent surfaces." Not only are capacious and permanent culverts, ditches, and drains abundantly provided, but subdrainage by tile drains is also employed to great advantage; and as a final precaution the road bed is ballasted, usually a foot deep beneath the sleepers and another foot around and over them, and for a width on double tracks of 26 ft., the quantity per mile amounting to 10,000 or 12,000 cub. ft. The material preferred for ballast is gravel containing a natural mixture of clean sand, and next to this broken stone in pieces not exceeding $2\frac{1}{2}$ in. in diameter. Limestone is not so good as gneiss, as it packs too densely, and trap rock also is likely to become too solid and rigid. A certain elasticity in the bed is essential for the durability of the rails; and where no other suitable material is at hand, common clay burned in lumps in great heaps intermixed with bituminous coal has been found to answer very well, especially if hard-burned. Cinders and small coal are excellent materials, and in Holland shells and broken bricks are extensively used. The road bed through the long English tunnels, and also upon the viaducts, is well ballasted, and the wear of the rails is thereby materially decreased. The wooden sleepers on many European and some American roads are also protected by some chemical application. (See PRESERVATION OF WOOD.) The ordinary duration of sleepers upon American roads is hardly 7 years, but upon English roads it is 15 years and upward. By the scrupulous attention directed to these details in building the European roads a great saving is effected in the cost of "maintenance of way," engines, and working. Only one half as much fuel is consumed to the mile run on the English and French roads as on those of the northern United States; and the consumption of fuel may be taken as a measure of the resistances overcome. If the English trains are from 20 to 30 per cent. lighter than those of American lines, they are run 25 per cent. faster, thus requiring about the same power. —The superstructure of railroads is almost universally laid upon transverse wooden sleepers, the primary object of which is to give a steady bearing upon the road bed. Seasoned white oak is preferable to any other wood

for strength and for holding the spikes. Hemlock is better than chestnut, and both these are extensively used in the United States. Their dimensions are commonly 8 ft. long with 7, 8, or 9 in. width of bearing surface, and their distance apart from centre to centre is from 2 ft. $1\frac{1}{2}$ in., as on the Erie road, to 2 ft. 6 in. On the English roads they are commonly 9 ft. long, 10 in. wide, often squared, and 5 in. thick. They are usually laid 3 ft. apart from centre to centre; and that a uniform bearing may be secured, particular care is taken that the sleepers are alike in size and regularly spaced in their beds. In France the experiment has been tried of cutting the sleepers in two in the middle, leaving one in every 10 or 12 ft. to bind the two rails together. The result was very satisfactory, the object being to prevent the spring of the full-length sleepers or the movement they sometimes acquire on their centre. But for these and detached rectangular blocks of any material, either transverse or longitudinal, it is essential that the supports should be well packed upon a thoroughly ballasted road bed. In England and India, where wood is expensive and iron comparatively cheap, rectangular blocks and also inverted pots of cast iron have been tried upon some of the roads, and with good results; but the conditions of cost are altogether unfavorable to the adoption of such devices in the United States. Granite sleepers have been tried and have continued in use upon one of the tracks of the Boston and Lowell road. They make a very hard and rigid support, and cannot be used in connection with wooden sleepers interspersed or alternating with them, unevenness in the track soon resulting. The smooth face of a rock ledge has been tried upon the Manchester and Leeds road, the rails being spiked directly down upon it. It was soon found necessary to take them up on account of the excessive wear upon the rails thus placed. The Great Western road in England is constructed with longitudinal bearings or sills measuring 10 in. square, and framed together by cross ties of 6 by 4 in. every 6 ft. The arrangement is said to be easy on the rolling stock, but as regards cost of maintenance of way this is one of the most expensive roads in England.—The iron rails, which are generally straight bars of wrought iron, differ greatly in the shape of their cross section, their weight, quality, and the manner in which they are secured to the road bed. Almost the first form was the fish-bellied rail, made about the year 1820. This soon gave place to others of more economical shape, as the T and the π rails, and to these was added the bridge or hollow rail, the form of which is nearly that of the letter U inverted. These have been variously modified in their figures and proportions, and a great number of other forms that may not be referred to either of these have been introduced upon different roads. In the United States an inverted T rail has

been in very general use, so as to be known as the American rail. It has a broad bearing base, and is easily secured to the sleepers by hook-headed spikes driven into elongated slots in the edge of the flange, or merely over the edge, thus allowing expansion and contraction of the rail with changing temperatures without disturbing the fastenings. With this rail the cast-iron chairs employed for seating and holding almost all other rails were at first used to strengthen the joints. Up to about the year 1854 the weight of rails had been steadily increasing from about 35 lbs. per lineal yard till it had reached 85 and in some cases even 100 lbs. No advantage was found in the very heavy rails, however, but on the contrary the iron in such large piles was necessarily less worked in the manufacture and was in a poor condition for wear. The tendency has since been to return to lighter rails, of 55 to 65 lbs. to the yard, and to require these to be made of iron originally good, the piles to be first rolled into blooms, and these to be again brought to a welding heat, and then rolled into rails. The miserable quality of much of the iron on American roads is due to the deficient working, the fibres of the iron as it wears showing that they had never been thoroughly incorporated together. In bargaining for it no test and no particular conditions of manufacture were required, as is customary in other countries. Rails of 45 lbs. have worn under the heaviest traffic for 20 years, as those laid in 1837 on the Reading railroad, while others of nearly double the weight have given out on other roads in one, two, or three years. The first rails employed on the Stonington railroad, of 54 lbs. to the yard, also lasted 20 years. Rails have gradually increased in length to 15, 16, 18, and 20 ft., and even 30 ft., which latter is now the common length made by American rolling mills and used upon American railroads. An important feature in the rail is its height or depth. Its stiffness, if the rail could be regarded as a rectangular beam, increases as the square of the depth; thus doubling the height and retaining the same weight of material quadruples the stiffness, but doubling the height and weight also increases its stiffness eight times. The effect of a want of stiffness in the rail is deflection between the supports under the weight and a mashing of the iron into the wood of the sleepers, which continually increases the mischief. Even between rigid supports the temporary depression of the rail is such as to present a continual ascending plane in front of the wheels, which the descent of the slope from behind does not in any measure compensate, the advantage of this being wholly balanced by other considerations. In 1857 steel rails were first rolled in England, and so greatly were they found to surpass iron rails in endurance, that, notwithstanding their greater cost, the demand for them kept ahead of the capacity of the mills to make them, till Besse-

mer's process of producing them from the puddling furnace reduced their cost and greatly increased the demand for them. At first steel rails were used only at such points as were subjected to extraordinary usage, as at terminal stations and for switches, frogs, and crossings. They were gradually introduced by the roads having the heaviest traffic, and finally they have come to be used in the first construction of many of the more important new roads, and by nearly all the old ones instead of the iron rails as they wear out. The following figures show the sections of rails now commonly in use in America and England.—Various devices



Sections of Rails.

have been invented and used from time to time in securing rails to the sleepers, and for keeping their ends together. All of them recognize the effects of expansion and contraction of the rails under the action of the weather, and in laying rails a proper allowance, varying with the length of the rail and the variations of temperature, is always made for this. By neglect of this precaution the rails heated by the sun have sometimes expanded so as to be thrust upward, lifting the sleepers one or two feet out of the ground. From this cause, a train running in June, 1856, on the North-eastern railway in England, at 40 m. an hour, was thrown off the inside of a curve, though the 82 lb. rail was fastened every three feet in heavy chairs and "fished" at the joints. Almost the universal fastenings in England used to be cast-iron chairs, made to hold the rail in an opening in the top, into which it was seated and keyed by a wooden wedge. The chairs were themselves strongly bolted down upon the sleepers. Those for receiving the two ends of adjoining rails were much heavier and stronger than the others, weighing from 26 to 39 lbs., and others 18 to 26 lbs. It is of great consequence to keep the ends of the rails securely upon the same horizontal line. If one end is depressed by the weight coming upon it, the wheel strikes the end of the next rail with a concussion that soon shatters the rail, and being repeated at other joints seriously injures the rolling stock. Various methods of keying and fastening the ends of the rails have been used, but they have generally been discarded in favor of what is known as the fish joint, first tried in 1843 at New Castle, Del., but not finally adopted to any extent till 1847. This method was not favorably received on American roads at first, owing to the difficulty of applying it to the low rails generally in use, but in some form or other it has finally superseded all others everywhere. As first proposed, two sleepers were to be placed 6 in. apart at the joints, and

two plates of iron slightly wedging were to be driven one on each side between the jaws of the chairs flat against the sides of the two rails. Instead of this, however, a pair of iron or steel plates 18 in. long, $\frac{3}{4}$ in. thick, and about 3 in. wide, are bolted together through the rails with $\frac{3}{4}$ or $\frac{7}{8}$ in. bolts, the holes in the rail being elongated to allow for contraction and expansion. Another form of fish joint is constructed by applying the bars to the flange of the rails and bolting them firmly to a suspension plate extending under the joint from one rail to the other. Nearly all the forms of the fish joint will give a smooth track when first laid, but the natural tendency of the nuts holding the fish plates to the rails is to work loose and thus to weaken the joint. Various devices more or less efficient have been invented for locking the nut and thus insuring the stiffness of the joint. In order that trains of cars may pass from one track to another an extra pair of rails are laid down, which can be moved so as to complete the connection with either one of the lines as desired and break it with the other. These movable rails are called switch-
es, and are commonly controlled by a long bar under the surface connecting with an upright lever at the side of the road. This is in the care of the men known as switch tenders, whose duty it is to see before the approach of every train that the rails are so placed as to carry it upon the right track. Turn-tables are platforms constructed of wood or iron which can be pushed round upon a circular track sunk below the level of the ground. A locomotive or car being run on to the platform, it is thus easily turned about or directed upon any other diverging track, numbers of which usually concentrate around the turn-tables.—The passenger cars or carriages used upon railroads are generally constructed after either the English or American plan. The former had its origin in the old-fashioned stage coach, and in many instances preserves the outlines of the stage coach body on its sides. It is generally about 24 ft. long and divided into four compartments, each carrying six passengers. Each compartment is upholstered according to the class to which it belongs, and is furnished with two doors for ingress and egress, the upper parts of which are of glass. These compartments have no communication with each other, nor is there any means of passing from one carriage to another, except by the precarious means of a foot board running along the outside of the carriages. They are carried by four and sometimes six wheels, fastened rigidly together. The American passenger car, as before shown, had its origin in the sharp curves of

the American railroads, and was originally constructed by splicing two common English carriages together and placing a pair of bogie trucks under each end. At first these trucks were made with four wheels, but now they are frequently made with six and eight, the weight of the car being equally distributed over them by means of equalizing beams. The cars are from 46 to 60 ft. long, are entered by doors at the ends, and carry from 44 to 62 passengers. They are warmed by stoves or hot-water heaters, and are furnished with water and water closets, while the English carriages have none of these conveniences. The American cars were formerly coupled into trains by means of links and pins, but these together with the weak platforms connecting them were found to be the cause of many accidents. They have been replaced to a great degree by Miller's patent buffer, coupler, and platform, which couple the cars automatically, hold them together without motion, and in case of accident, the platform being strongly trussed, the danger of crushing or telescoping is entirely obviated. Sleeping cars were first adopted by a few of the leading American railroads about 1858, but they were for the most part crude and unsatisfactory in their arrangement and appointments. They were constructed under a variety of patents, employed various devices which had not yet been perfected by experience, were chiefly used for local travel, and did not leave the roads owning them. It soon became apparent that a class of cars that could be used both night and day, and run between distant points over several different roads, would be necessary to supply the growing want of the public. In 1864 George M. Pullman invented and patented a car designed to meet all the requirements of the problem, and so great was its success that it grew rapidly into popular



Pullman Parlor Car.

favor, and supplanted all others. In 1867 the Pullman palace car company was organized for the purpose of conducting the sleeping car business, now rapidly increasing in magnitude and importance. It contracts to furnish its

cars to railroad companies for a period of 15 years, giving each company the option, if exercised within a reasonable time, of purchasing a half interest in the cars assigned to its road, and of sharing equally with the Pullman company in the results of the business. The Pullman company furnishes the various kinds of cars required for the business, employs the servants and attendants, and maintains all the interior equipment pertaining to the sleeping accommodations. The railroad companies control the movements of the cars, carrying their passengers in them, receive the whole of the railroad fares, and maintain the outside and running gear of the cars, exactly as they do their own. Upward of 60 railroads in the United States, Canada, England, and Italy have entered into contracts with the Pullman company. Some of them are participants in the entire business, while others are joint owners with the Pullman company in the cars assigned to their respective lines. The present standard sleeping car exceeds the weight of the ordinary 12-wheeled first class passenger car used on the leading railroads by about $2\frac{1}{2}$ tons, the excess being due to the bedding and partitions essential to the sleeping arrangements. These cars are now used on more than 30,000 m. of railroad in America, and the advantages of the system have so recommended them that they have recently been adopted with favor in England and Italy, and will probably make their way at an early day to the railroads of the rest of Europe. The Pullman company has adopted a number of ingenious devices which very greatly increase the comfort, safety, and healthfulness, and decrease the fatigue, anxiety, and loss of time of railroad travelling. The freight cars or carriages used upon railroads are constructed according to two distinct systems, the English and American, which like the passenger cars differ especially in reference to the trucks, the former using the rigid four-wheel system, and the latter the bogie truck system. The American railroads use wheels of cast iron or low steel almost exclusively, the surfaces of which are hardened by chilling them in cooling; while all European roads use wheels of wrought iron, steel, and wood. The former are much cheaper, but said to be more liable to accident.—In treating upon railroads numerous important considerations present themselves besides those already noticed, each of which should receive particular attention. Such especially are the viaducts, bridges, and tunnels, and the immense cuts or excavations and embankments; also the processes employed by the engineers in laying out the road, their seeking for the most level and the straightest line while restricted by the amount of means provided, and planning the excavations and embankments, so that the material supplied by the former shall amount as near as may be to that required by the latter. The station houses, which in themselves are an important class of structures peculiar to this

new improvement, are generally constructed of brick or stone in Europe, of iron in tropical countries, and in America at first of wood, for which brick, stone, or iron is nearly always substituted as soon as the change can be afforded. Railroad bridges are generally built of iron and placed upon stone or iron supports in all countries except the United States, where engineers in the first construction of railroads more commonly use timber owing to its great abundance, lightness, and cheapness. Tunnels constitute a remarkable feature in the construction of railroads. In Great Britain, where it is considered to be more economical to tunnel through rock than to make open cuts deeper than 60 ft., many tunnels have been constructed, several of them over 3 m. long. The Mont Cenis tunnel through the Alps is nearly 8 m. long; the Hoosac tunnel in Massachusetts is nearly $4\frac{1}{2}$ m. long; and it is now proposed to construct one under the straits of Dover, 21 m. long, to connect the English and French railway systems. (See TUNNEL.)—*Cost of Railway Construction and Management.* The comparative economy in the construction and operation of railroads has received particular attention from many competent engineers and railroad managers. It is well known that the English roads have been built at an extraordinary amount of first cost, but it does not appear that the expenditures for actual construction have been much larger than in the United States for works of similar character. The practice in the two countries has been entirely different. In England the plan has been to build them in the most solid and substantial manner from the start, and to supply them with every appliance necessary for their operation; while in America the general rule has been to build upon the cheapest possible plans, with light rails, narrow banks, heavy gradients, wooden bridges, and less expensive cars, buildings, and machinery, and to depend upon future earnings for the means with which to bring the works up to the standard required by the increasing business of the line. Among the large items of cost upon English lines is that of land damage or right of way, the average of which has been rated at about \$45,000 a mile, or about the average cost of American railroads. The "parliamentary expenses," incurred in obtaining charters, are also very great, amounting in several instances to an average of \$7,345 a mile, and in the case of the Great Northern railway to an average of \$16,000 a mile. The several items of interest, discount on loans, bonuses, and commissions, also add greatly to the aggregate cost of railroads in all countries. Larger expenditures than are usual in the United States are involved from the more unfavorable physical features of the country, the topography presenting no long lines of watercourses nor wide table lands, both which are common in this country. Boggy districts are also more frequent in England, and the construction of a

permanent road across these has often cost immense sums. Even when the embankments through them have been apparently completed, as much more material has in some cases been required for their maintenance in consequence of their subsidence. The bridges, viaducts, tunnels, &c., are much more numerous and expensive structures upon English than American roads. The superior equipment of engines and carriages adds a considerable amount to cost per mile, some of the roads having even more than a locomotive for every mile, the cost of which averages about \$12,000 each. Among the heavier items of expense are the approaches to the cities, London particularly; where the roads for several miles are frequently constructed upon arched viaducts of brick. The London and Greenwich line, $3\frac{3}{4}$ m. long, thus built, cost \$1,299,651 a mile; the London and Blackwall, of the same character, \$1,406,304. From such causes the total cost of English roads has amounted to about \$170,000 a mile. The French double-track roads in 1857 were estimated to have cost \$101,877 a mile; about one fourth of the whole was for earth-work and "works of art," as bridges, viaducts, and tunnels; one quarter for rails, chairs, ties, and keys; and \$6,039 for ballast, much more even than upon the English roads. Few roads in the United States have reached an expenditure for construction equal to that of the least expensive roads of Great Britain; and the average cost of all those of the United States is estimated at little more than \$60,000 a mile.—The effect of the superior character of English railways is shown in a remarkable manner by the low rate per mile at which the permanent way is kept in order, and by the cheapness with which they are operated as compared with the same items for equal traffic on American lines. In Great Britain the distance run to a ton of bituminous coal or of coke varies from 75 to 118 m., the latter having been obtained with coke for a full year on the Cork and Bandon railway; 75 m. is considered to be a fair average. In America the number of miles run per ton of bituminous coal varies with the quality of the coal, weight of the trains, and gradients of the roads, from 35 to 60 m.; 45 m. may be considered as about a fair average. The rate at which trains are run upon the English roads is not so high as it was formerly. Passenger trains run from 18 to 40 m. an hour, the latter being the speed of some of the express trains; the average rate is about 27 m. Freight trains average about 15 m., including all stops. The highest rate for a passenger train attained for a few miles together has been 73 m. an hour. A speed of 60 m. is made daily for short distances, and sometimes even of 78 m. an hour. The average speed is considerably greater than on the French roads, and also exceeds that on the American, where it is not over 25 m. an hour, though 35 and even 40 m. are made upon some of the principal lines by the fastest trains.—According to the report of the Massa-

chusetts board of railroad commissioners for the year 1874, it appears that one passenger was killed and seven were wounded during the year by causes over which they had no control. The whole number of persons carried by rail during the year was reported at 42,480,000, and the average journey at 16 m.; it consequently follows "that the average journey by rail, resulting in death, during the last year, has been 679,000,000 m., and that resulting either in death or injury has been 85,000,000 m.; in other words, in estimating the chances of danger in travelling by rail in Massachusetts for any given person, the returns of the last year show that he will probably travel 85 millions of miles before sustaining any injury from an accident from causes beyond his control. The ordinary average of accidents of this description in Massachusetts, in years past, has been about one passenger to each 1,400,000 carried; during the past year it has been one only to each 5,300,000 carried, and for the previous year one to 42,400,000 carried." In contrast with this it is added that "through a period of ten years, 1859–'69, one passenger was killed or injured on the French railroads to each 674,000 carried, and in England the average has been about one in every 430,000; or, in the first case, twice the proportion* of Massachusetts casualties, and in the last, three times the proportion." The foregoing is a more favorable statement than can be made by the average of the American railroads, and yet it is believed that they in turn can show a greater degree of safety in the transportation of their passengers than obtains in either England or France.—*Narrow-gauge Railroads.* As before stated, the standard railway gauge of the world is now 4 ft. 8½ in. In 1832 a horse tramway, since known as the Festiniog railway, was built in Wales for the purpose of carrying slate from the quarries to Port Madoc. It was nominally of 2 ft. gauge, and was used as originally designed till 1863, when C. E. Spooner, the engineer of the line, recommended the use of locomotives. Seven of these were built, two weighing eight tons and five weighing ten tons each. In 1869 Mr. Fairlie built an engine for this road known as the Little Wonder. It is mounted on two trucks or bogies, each having four coupled wheels 2 ft. 4 in. in diameter with a wheel base of 5 ft., making the total wheel base of the engine 19 ft. The cylinders are $8\frac{3}{16}$ in. in diameter and 13 in. stroke, and the entire engine weighs 19½ tons. The success of the Festiniog railway and the Fairlie engines became widely known; and the writings of Mr. Fairlie, published in 1870 and 1871, on "The Gauge for the Railways of the Future," again attracted the attention of engineers throughout the world to the question of the gauges. The advocates of Fairlie's system claim: 1, that the cost of constructing, taking the average expense, will be found to vary as the gauge; 2, that every inch added to the width of the gauge beyond what is ab-

solutely necessary for the traffic adds to the cost of construction and increases the dead weight of the rolling stock and the cost of working; 3, that the dead weight of the trains is in direct proportion to the gauge on which they run; 4, that a saving in first construction equal in many cases to 33 per cent. can be made by the adoption of the narrow gauge, which allows greater curvature, narrower banks, and lighter bridging, rails, and ties; 5, that narrow-gauge railroads have relatively greater traffic capacity than roads of the standard gauge; and finally, that they are safer and can be more economically maintained and operated. Narrow-gauge railroads have been built in many parts of the world. At the end of 1874 there were 2,025 m. in operation in the United States, 511 m. under construction, and about 6,000 m. more projected; and in Canada 594 m. were in operation and 886 m. projected. The gauge of these roads is generally 3 ft., though that of the East Indian roads is 3 ft. 3½ in. or one metre, and a few in other countries are 3 ft. 6 in. The rails weigh from 24 to 52 lbs. per lineal yard. The engines, rolling stock, and other appurtenances are generally built after the same plans used by the roads of the standard gauge, but proportionally smaller. — *City Railroads.* Although railroads were long used in Great Britain with horse power only, this method of working them was there generally abandoned; but in the United States their peculiar adaptation for the streets of cities was early perceived, and they are now in use upon the principal thoroughfares of most of the cities. Cars seating from 22 to 50 passengers are easily drawn by two horses at the rate of 5 or 6 m. an hour, taking the place of a much larger number of omnibuses, and running at considerably less expense. The trucks turning upon pivots, the carriages turn round the corners of the streets without difficulty; and the rails being laid nearly flush with the surface, but little obstruction is presented by them to the passage of vehicles across the track. The importance and utility of this class of railroads having been fully demonstrated by their use in the United States, they have been introduced after much opposition into the principal cities of England, France, Belgium, Germany, and Spanish America. The metropolitan district railway of London is a double track road operated by steam, about 19 m. long, running through a tunnel with occasional open cuts, by a circular route from the Moorgate street station to the mansion house. It was opened in 1863, and cost about \$3,500,000 a mile. Another quick transit railway in London runs from Charing Cross to the city terminus in Cannon street, and is carried on arches over the tops of the houses. It crosses the Thames twice near its termini, and carries an enormous number of passengers. The necessity for means of rapid transit is greater in New York than in almost any other large city, on

account of its excessive length in proportion to its breadth, and the subject has been discussed for many years. One of the plans most persistently urged was that of a viaduct railroad under Broadway, which required the excavation of the entire street, with provision for gas and water pipes, sewerage, and ventilation, to be covered by a continuous arch supporting the surface roadway. A short experimental section of a proposed pneumatic railway was constructed under Broadway in 1870, and various other subterranean projects have been put forth; but plans for elevated roads have met with the greatest favor. One such road, that of the "New York Elevated Railway Company," begun in 1866, has been in successful operation since 1872 from the Battery along Greenwich street and 9th avenue to 30th street. It consists of a single track, carried by longitudinal wrought-iron girders resting on corbels supported by a single line of wrought-iron posts planted along the curbstones. The original plan of operating it by stationary engines and endless wire ropes was abandoned for "dummy engines," each drawing three cars, adapted for 36 passengers each, at the rate of nearly 20 m. an hour. The "Gilbert Elevated Railway Company," chartered in 1872, on the plan of Dr. R. H. Gilbert, propose to build a double track tubular road carried by a trussed iron bridge spanning the street, which is to be supported by a series of arches springing from wrought-iron piers resting upon stone foundations at the edges of the sidewalks. No complete system of rapid transit for the city seeming likely to be constructed under existing circumstances, the legislature in 1875 provided for the appointment of a commission with full power to decide upon a general plan and devise means for carrying it out. This body reported in October in favor of a double track elevated road on each side of the city, to be constructed by the two companies above named, or by another provisionally organized under the powers conferred upon the commission, called the "Manhattan Railway Company." Considerable latitude is allowed as to details, but the whole system is to be completed by Dec. 1, 1878. — *Mountain Railroads.* In 1865-'8 a railroad was constructed up Mont Cenis by the English engineer Fell, in which the traction of the engine is secured by two wheels working horizontally under heavy pressure against the sides of a middle rail. (See CENIS, MONT.) In the railroad up Mt. Washington, New Hampshire, built in 1866-'9, the traction is effected by a cogged wheel working into a cogged rail firmly spiked to the track. The Mt. Rigi railway, in Switzerland, on the same plan, was completed in 1873. A mountain railway has been devised upon which the cars are carried astride of a single line of rails in turn supported upon a line of posts; but this plan has not yet been successfully applied.—For the detailed statistics of railroads in the Uni-

ted States and Canada reference should be made to the manuals published annually in New York by H. V. and H. W. Poor and Edward Vernon; and for methods of construction to the various works in English, French, and German upon railroad engineering.

RAILWAY, Atmospheric. See PNEUMATIC DISPATCH, and PNEUMATIC RAILWAY.

RAIMONDI, Marc' Antonio, an Italian engraver, born in Bologna about 1480, died there subsequent to 1539. He was instructed in design by Francesco Francia, some of whose pictures he engraved as early as in his 15th year. Subsequently he imitated Albert Dürer, and while on a visit to Venice made facsimile copies on copper of his set of 36 woodcuts representing the life and passion of the Saviour, and of another set of 17, representing the life of the Virgin; and the imitation was so exact that Raimondi's prints sold for originals. Dürer was obliged to visit Venice to procure redress, but only succeeded in preventing the use of his monogram. Raimondi soon went to Rome, where he was employed in engraving the choice works of Raphael, and afterward of Giulio Romano. He is said to have excited the wrath of Pope Clement VII. by executing a set of obscene prints, for which he was thrown into prison; but he appeased him by an admirable engraving after Bandinelli's picture of the "Martyrdom of St. Lawrence." The sack of the city by the army of the constable de Bourbon in 1527 reduced him to poverty, and he returned to Bologna. For purity of outline, correct expression, and drawing, he was one of the best engravers on record. The British museum has 500 of his choicest productions.

RAIN, the moisture of the atmosphere condensed into drops large enough to fall with perceptible velocity to the earth. The water thus precipitated is quite pure, except in so far as it absorbs a slight quantity of air, carbonic acid, ammonia, or nitric acid, from the atmosphere. The formation of rain is in general a continuation of the processes of the formation of clouds, dew, and fog. The deposition of moisture depends upon the cooling of the atmosphere, as was first recognized by Dalton (1787), but concerning the precise process by which that cooling is effected erroneous views have been widely entertained. In general it may be said that the temperature of a given mass of warm moist air is lowered in the ordinary course of atmospheric phenomena by one or another of the following four processes: 1, by radiation to the cold sky, according to the views first developed by Fourier (1812) and Wells (1818); 2, by radiation to neighboring masses of cold air, or the cold ground; 3, by mixture with cooler air, a view suggested by Hutton (1787), the slight importance of which was demonstrated by Espy (1833, &c.); 4, by the absorption of heat in the expansion of ascending air, a view first developed by Espy. Radiation takes place especially at night during the winter, when the upper regions of

the atmosphere contain but little moisture to hinder the free radiation of heat, but the result is more frequently snow or cloud than rain; its importance has been well shown by Tyndall (1859, &c.). The third process depends for its effect upon the principle that the density of saturation increases faster than the temperature, so that if we mix two equal volumes of saturated air having different temperatures, the resulting mixture will have a temperature somewhat less than the average of the two, and the quantity of moisture then present will be slightly in excess; but the condensation of even a slight portion of this moisture into cloud evolves latent heat sufficient to elevate the temperature above the point of condensation. The fourth of the above processes is doubtless by far the most efficient of all in lowering the temperature and producing rain. Its precise importance in the economy of the atmosphere has been well shown by the researches of Espy (1833, &c.), Thomson (1862), Peslin (1868), Hirn (1870), Reye (1872), and Hann (1874). According to Hann, the ascent of dry air to higher altitudes must, by reason of its expansion under the lower pressure there prevailing, be from this cause alone attended with a uniform diminution of temperature at the rate of 0.9907° C. per 100 metres of ascent, a rate that becomes 0.9751° when the moisture in the air gives it a relative humidity of 60 per cent. But so soon as by this cooling the air is brought to its point of saturation and the formation of cloud or rain, snow, or hail begins, the evolution of latent heat largely reduces the rate of diminution of temperature. As the saturated air ascends in the form of cloud, its temperature no longer diminishes uniformly, but at a decreasing rate, so that a point may be ultimately reached where its rate of diminution becomes zero. In general, therefore, clouds thus formed are warmer than the adjacent clear air. Doubtless it rarely happens but that rainfall is produced by the concomitant action of two or more of our four principles. Such attempts as have been made to show that electricity has an influence in causing rain must at present be considered wholly unsatisfactory; yet it is acknowledged that the electrical displays which so frequently accompany rain, and especially hail, are but very imperfectly understood. Of other phenomena attending the formation of rain, the most important is the general elevation of temperature on the earth's surface, which is largely due to the great amount of sensible heat thrown into the atmosphere by the condensation of vapor into rain. The other important factor in this elevation of temperature is probably the protection afforded by the clouds against radiation, so that any heat which emanates from the surface of the earth is retained under the covering of clouds.—The distribution of rain over the surface of the globe is of importance to the interests of mankind both as regards its quantity and its frequency. As regards the quan-

tity, accurate measurements are wanting for many portions of the globe, but the following table, condensed from a larger one in Symons's treatise on rain (1867), gives an approximate presentation of the subject:

COUNTRIES.	Annual rainfall, inches.	COUNTRIES.	Annual rainfall, inches.
EUROPE.		TURKEY: Jerusalem...	
Austria: Vienna.....	19·6	Smyrna.....	27·6
Belgium: Brussels....	28·6	AFRICA.	
Denmark: Copenhagen..	22·3	Algeria: Algiers.....	27·0
France: Marseilles.....	19·0	Oran.....	22·1
Montpellier.....	30·3	Cape Colony:	
Paris.....	22·9	Cape Town.....	24·3
Bayonne.....	56·2	Madeira.....	30·9
G't Britain: London....	24·0	St. Helena.....	18·8
Cardiff.....	43·0	Sierra Leone.....	86·0
Glasgow.....	39·0	NORTH AMERICA.*	
Galway.....	50·0	British Columbia:	
Greece: Corfu.....	42·4	New Westminster.....	54·1
Holland: Rotterdam....	22·0	Honduras: Balize.....	153·0
Iceland: Reykiavik....	28·0	Alaska: Sitka.....	89·9
Italy: Milan.....	38·0	West Indies:	
Malta.....	15·0	Barbadoes.....	75·0
Norway: Bergen.....	84·8	Havana.....	50·2
Portugal: Lisbon.....	28·0	Kingstown.....	83·0
Prussia: Berlin.....	23·6	St. Thomas.....	60·6
Russia: St. Petersburg..	16·2	SOUTH AMERICA.	
Astrakhan.....	6·1	Brazil: Rio de Janeiro	53·7
Sicily: Palermo.....	22·8	Venezuela: Cumana....	7·5
Spain: Madrid.....	9·0	AUSTRALIA.	
Sweden: Stockholm....	19·7	New South Wales:	
Switzerland: Geneva....	31·8	Sydney.....	46·2
ASIA.		South Australia:	
China: Canton.....	69·3	Adelaide.....	19·2
Peking.....	26·9	Victoria: Melbourne..	30·9
India: Bombay.....	84·7	Tasmania:	
Cherrapongee.....	610·8	Hobart Town.....	20·3
Madras.....	44·6	POLYNESIA.	
Malay Peninsula:		Tahiti: Papiete.....	45·7
Singapore.....	190·0		
Asiatic Russia:			
Nertchinsk.....	17·5		
Tiflis.....	19·8		

The extensive mass of information presented in Mr. Symons's table shows that the regular decrease of rainfall as we proceed from the equator to the pole, announced many years ago by Humboldt and others, was a too hasty generalization, and that the data on hand must be further increased, and must be studied with reference to the local influences bearing upon every station, before any exact conclusion can be arrived at, other than this, that the heaviest falls are in the tropics, and that beyond them there is no material decrease. The study of about 1,500 stations by Schmid shows that the rainfall appears not to depend entirely either upon the latitude or the season of the year, but principally upon the relations between the general system of atmospheric currents and the position of the station in reference to geographical and topographical features; thus the enormous rainfall of Cherrapongee, India, depends directly upon the ascent of the current of warm moist monsoon winds over the Cossya hills. In general the geographical distribution of rain proves that rainfall is principally due to condensation in ascending currents of air, and in a less degree to the cool-

ing due to radiation of heat. Concerning the annual and daily period of the rainfall, and the connection between rainfall and the direction of the wind, see METEOROLOGY.—In regard to the frequency of rain, while in many parts of the world a broad distinction exists between the rainy and the wet season, elsewhere we are able to distinguish only between the seasons of short heavy showers and those of long continued gentle rains. A general view of this important feature of the rains throughout the globe is afforded by the accompanying chart, which is due to Wojeikof (1874). This meteorologist says that the normal condition of the oceanic portions of the northern hemisphere is a subdivision into four zones: 1. The equatorial zone of constant rains; this is shifted with the seasons N. and S. of its mean position, and on the average extends from within a degree of the equator to 10° of N. latitude. 2. A rainless zone of trade winds, extending from lat. 10° to 25° or 30° N. 3. The subtropical zone of rain, extending to lat. 40°; into this zone during summer the trade winds extend, and but little rain falls; in winter variable winds with frequent rains occur. 4. A zone of rains with S. W. winds, whose occurrence is distributed pretty equally throughout the year, and which extend from lat. 40° N. to the pole. On passing from the ocean to the land, we find that the third or subtropical zone almost entirely disappears, while the regions of rain at all seasons, and of summer rains, extend further southward. Other features in the distribution of rain will be seen from the map itself. In the article METEOROLOGY will be found information concerning the general laws of rainfall in so far as they pertain to dynamical meteorology. —On the question of the secular variation in rainfall as an item of climatology (specially interesting to civil engineers in connection with the industries of any country), the most extensive investigations have been made by Symons (1870) in England, Schott (1872) in the United States, Rawson (1873) in Barbadoes, and Raulin (1871) in France. The equally important studies of Meldrum (1872) and Köppen (1873) have relation more directly to the eleven-year periodicity. Symons, as the result of all observations in Great Britain from 1725 to 1869, shows that if we take the average of 60 years (from 1810 to 1869) as our standard, the rainfall for each decade will be relatively as in the following table:

DECADE.	Relative rainfall.	DECADE.	Relative rainfall.	DECADE.	Relative rainfall.
1730-39	0·899	1750-59	0·935	1880-89	1·014
1740-49	0·706	1760-69	0·965	1840-49	1·026
1750-59	0·855	1800-09	0·882	1850-59	0·952
1760-69	0·911	1810-19	0·986	1860-69	1·015
1770-79.	1·035	1820-29	1·032		

Schott, in his "Tables of Rainfall in the United States" (Smithsonian institution, 1872,) gives the result of all observations that have

* For Canada and the United States, see METEOROLOGY.

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been made at about 1,200 stations, showing that the slight general variations in the rainfall throughout the country have somewhat of a periodical nature; thus along the seaboard from Maine to Virginia, as also in New York, and in the Ohio and Mississippi valleys, there has been an increase (amounting however to

scarcely 1 per cent.) in the average annual precipitation during the last 50 years; on the southern Atlantic coast it appears to have been on the decrease. The following table, condensed from those of Schott, gives the relative rainfall by decades for several sections of the United States:

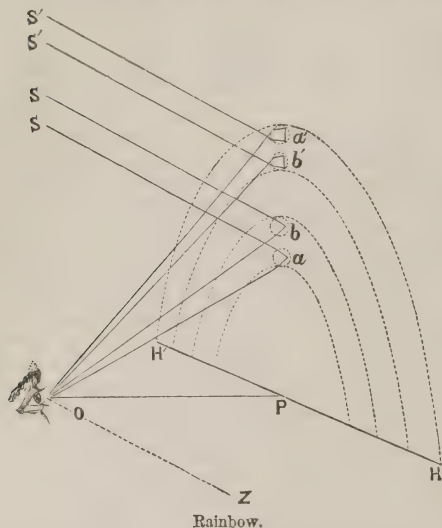
DECADE.	Eastern and Middle States.	New York State.	The Northwest.	The Ohio Valley.	The Southwest.	The Gulf States.	The South Atlantic States.	California.
1810-'19.....	0.933	.....	.....	.....	.....	.....	.....	.....
1820-'29.....	0.971	.....	.....	.....	.....	.....	.....	.....
1830-'39.....	0.981	0.988	.....	0.926	.....	0.955	.....	.....
1840-'49.....	0.999	0.978	0.969	1.043	1.067	1.000	1.068	.....
1850-'59.....	1.050	1.028	1.031	1.009	0.972	0.962	0.974	1.211
1860-'69.....	1.068	1.057	1.030	0.980	.....	1.032	.....	1.066

Both the British and American series therefore unite in showing that during 60 years there has been no appreciable change.—For further details on the subject of rain, see *Wojeikof, Die atmosphärische Circulation*, appendix No. 38 to Petermann's *Geographischen Mittheilungen* (Gotha, 1874). For information relating to the United States, see the above cited "Tables of Rainfall." With regard to the rainfall in Great Britain, see the annual volumes of "British Rainfall," by G. J. Symons, which contain every variety of information on this subject, including the actual measurements at 1,500 stations and numerous special investigations into sources of error.

RAINBOW, an arch of concentric colored bands, visible usually on a portion of sky overspread with falling rain drops, and always on that side of the observer opposite to the place from which the sun or moon is shining at the time. When the field of falling drops is large, and the illumination thrown on it is bright, a second bow, exterior to and concentric with the first, appears. The inner, or most usual, is termed the primary, the outer the secondary bow. Each shows the same colors, and in the same succession, as those obtained in decomposing a beam of sunlight by means of a dispersing prism of glass; but in the two bows the colors lie in opposite order; in the primary the red is outermost, in the secondary innermost. The primary is always the brighter, and decidedly the narrower. When the light is abundant, this bow is often accompanied by successive bands of red and green, lying just within it or overlapping its violet edge, concentric with it, but extending through parts of its course only, and especially where it nears the horizon; these are called supernumerary bows. The common centre of the two bows is always in the direction of the antisolar point; so that, of course, the rainbow rises at the same rate as the sun declines, or declines if the sun is rising.—The conditions requisite to produce the rainbow have been in a general way understood from an early period, though its causes were not. The earliest known attempt at an explanation of it is that of Aristotle. He observed that from a glass globe filled with water, and set in

the sun, certain colors were always returned at certain angles with the course of the sun's beams; and he properly explained the circular form of the bow, by saying that if the sun-beam passing through the observer's eye be taken as an axis, and the globe be revolved round this axis, and at the same distance from it in all parts of its course, the same colors, preserving their angle with the direction of the sunbeams or of the axis, would be visible through all parts of this course; and hence it followed that a rainbow would result if there were globes enough, and so placed as to reflect colors at the same time from all parts of an arc of such a circle. The colors were supposed to be merely reflected from the globe, or (in the sky) from the drop of water, until *Fleischer of Breslau* (1571), concluding that reflected light does not give colors, stated as a consequence that the rays must enter the drops. Of the light falling on the presented side of the drops, of course part will be reflected, but another part will enter and be refracted at the same time; striking on the inner opposite surface of the drop, part of this beam will emerge and escape, while another part will be reflected; and on again striking the side of the drop toward the spectator, though a portion of this residue of the first beam undergoes a second reflection, another portion emerges, again refracted, and, if at a proper angle, then passes to the eye. *Kepler* agreed in this view, but erred in supposing the entering light to be that of rays grazing or tangent to the upper sides of the drops. *Antonio de Dominis*, in 1611, carefully repeated the experiments with the glass sphere filled with water, showing in sunlight very vivid colors to a great distance, and each at an angle of its own. *Descartes* showed: 1, why there must be on the illuminated field of falling drops a circular belt of colors bright enough to be seen, and always of a definite diameter; and 2, that the colors are in separate bands or stripes in this, because they are not equally refracted. He gave the reasons why the colors must be just where they were, and in bands just so broad, if they all appeared; he could not tell why they must all appear. This element *Newton* supplied, when he discovered (1666) that sunlight is decomposable

into a fixed number of different colored rays, refracted or bent at the same time in different but definite degrees, so that they must appear, under given circumstances, separated just so much, and always in the same successive order. This result will follow, then, whether sunlight is dispersed by prisms or by transparent spheres, as water drops. The mathematical theory, which belongs to Descartes, may be found in the higher text books of optics, and



is illustrated by the accompanying diagram taken from Deschanel's "Natural Philosophy." If a ray of light pass through the centre of a sphere or drop, its course is in an axis of the sphere or drop; it is not refracted. A ray parallel with this, and very near it, is refracted within the drop, toward this axis, but very slightly. Other rays, further and further from the axis, are refracted more and more toward it, but yet so as to fall, by lessening degrees, further from it on the inner or second surface of the drop; until, as Descartes proved, a ray, *Sb* or *Sa*, entering the upper side of the drop, when this is above the eye, and at a point for which its angle of incidence is 60° , will strike on the inner surface as far as any ray can do from the axis; the rays incident at greater angles than this, up to 90° , deviating again toward the axis. Of course, near this limit, the deviation is very slight for rays coming on either side, so that much more light within the drop will be accumulated just at this point of the second surface than at any other; and though part of it emerges here, a sufficient quantity is reflected, and that in rays which preserve a parallel course (*bO* or *aO*), after leaving the drop in the direction toward the spectator, to form a compact, parallel beam, bright enough to affect the eye at a great distance. The apparent radii of the arcs constituting the rainbow are constant, or nearly

so; they are expressed by the angles between the axis *OZ* and the lines *Oa*, *Ob*, &c., and are as follows: in the primary bow, for the violet $40^\circ 17'$, for the red $42^\circ 2'$; in the secondary bow, for the red $50^\circ 57'$, for the violet $54^\circ 7'$. A tertiary bow, formed by rays that have been thrice reflected within the raindrops, is possible at a distance of about $43^\circ 50'$ from the sun; but this is very rarely visible, owing to its faintness and other causes. From the above explanation, the following consequences are obvious: that the ordinary rainbows must be on the side of the observer opposite the sun; that their centres must be directly opposite the sun; that they must move with the motion of the sun, declining in the morning, and rising if seen at evening; that when the sun and the observer are in the same horizontal plane, as at sunset, the bows will be semicircles, and their altitudes then about 42° and 54° ; that they can never approach nearer than this to the zenith, unless the observer be on an elevated position, so that the sun can shine from below the horizontal plane in which he is; that at the tops of high mountains they may be seen as complete circles; and that, to one at the ordinary level, in the low and middle latitudes, they are never seen between about 9 o'clock in the morning and 3 o'clock in the afternoon; while in higher latitudes, where the sun is always very low in the sky, they may occur even at midday. If the rain is near, the bows may sometimes be seen prolonged upon the landscape. The small water drops constituting spray may afford a rainbow; hence it is seen in the mist arising near cataracts, and, because near, is then small, and may appear as a complete circle. A partial bow may be observed at times in drops of dew or rain upon herbage or grass. The formation of the supernumerary bows was explained by Young (1804), as due to interference of sets of rays emerging at angles very nearly those of the proper colors of the bows. Biot, and afterward Brewster, have shown that in all rainbows the light is polarized in the radial planes passing through the axis *OZ*, and hence polarized by refraction and reflection.—The lunar rainbow is usually single, the primary bow only, and is often white; when colored, it is but faintly so.—When the drops of rain are exceedingly fine, as in the case of clouds and fog, the rainbow proper is replaced by bows formed by the reflection and interference of light from these fine particles. The laws of these fog bows are deducible from the same principles that have served to explain the rainbow. The phenomena themselves are exceedingly brilliant; they were observed by Sykes in 1829 (see "Philosophical Transactions," 1835), but far more perfectly by the aeronauts of the past few years; beautiful examples are recorded in Glaisher's "Travels in the Air" (London, 1870).—The floating ice spiculæ or crystals that compose those higher clouds called cirri

affect the solar rays even more curiously than the spherical drops of water, causing the varied phenomena of parhelia, all of which are explainable on principles not materially different from those that apply to the rainbow proper.

RAIN CROW. See Cuckoo.

RAIN GAUGE, an instrument for measuring the amount of rain which falls upon a given area during a certain space of time. For approximate purposes a tub or bucket, with a thin-edged mouth, placed in a horizontal position for catching the rain, whose depth may afterward be measured by means of a graduated rod, may be employed, and if well constructed and used with care may fulfil most of the requirements of exactness. It is more common, however, to catch the fall in an accurately made funnel whence it flows into a holder, whose form is immaterial; it is subsequently measured either by weighing or by means of a tall graduated cylinder, which gives the average depth of the rainfall. The holder should have a capacity abundantly sufficient to receive all the rain that may be caught. It is difficult to employ a rain gauge to measure a snowfall unless the air is perfectly still, as the wind interferes with the reception of the snow; it is therefore generally preferable after a snow storm to take a cylindrical vessel of sufficient depth and with it cut out a section of the snow from some region which has an average depth of covering; the snow thus collected should be melted or dissolved in a known quantity of water and measured. For special studies different forms of gauges are employed, in which the opening of the mouth may be horizontal, inclined, or vertical; rain gauges are also attached to wind vanes so as always to be turned toward the wind. Very great discretion is required in the selection of the site of the instrument; the standard position of the mouth of the gauge is 8 to 16 in. above the surface of a broad level lawn; gauges in the neighborhood of trees and buildings or on the tops of isolated buildings are not allowable except for the purpose of investigation. —For the numerous details in reference to this important subject, see the annual volumes of Symons on "British Rainfall."

RAINS, a N. E. county of Texas, watered by Lake fork and other tributaries of the Sabine river; area, about 220 sq. m. It has been formed since the census of 1870. The surface is undulating and the soil fertile. There is considerable timber. Indian corn, wheat, cotton, tobacco, sweet potatoes, cattle, &c., are raised. Capital, Emory.

RAINY LAKE, a body of water, 50 m. long and of irregular width, on the border of Minnesota and British America, discharging through Rainy or Rainy Lake river (100 m. long) into the lake of the Woods. It receives the river La Seine, the outlet of Lac des Mille Lacs, from the northeast, and from the east the waters of a chain of lakes lying along the international frontier, and having their source in the height

of land dividing the streams that flow into Lake Superior from those that flow into Lake Winnipeg. It contains numerous islands. Near its outlet are the falls of Fort Francis, 20 ft. high. The lake and Rainy river below the falls are navigable by steamers.

RAISIN (Fr., a grape), the dried fruit of the European grape vine (*vitis vinifera*). None of our native grapes (see GRAPE) has yet afforded raisins suitable for commerce, though one or two varieties encourage the hope that some may yet be produced which will make good raisins. The European grape succeeds perfectly in California, and the production there is already sufficient to supply the home demand. The raisins of commerce are produced in the countries around the Mediterranean. The varieties recognized in trade arise not merely from the original differences in the grapes, but also from the methods of drying. Among the best sorts are those known as the Malaga, muscatel, or "sun raisins;" these are dried upon the vines, as, unlike most fruits, the grape does not drop when ripe; the stem to each bunch when ripe is twisted or partly severed, and the grapes soon shrivel by the evaporation of the water they contain, and become sweeter by the consequent concentration of the pulp; when dried the bunches are taken off and carefully placed in boxes with sheets of paper separating the layers. These raisins, better than any other sort, retain the freshness and bloom of the fruit, and when fresh have less of the saccharine exudation which is found upon most of the other varieties. The common kinds of raisins are prepared by drying the ripe grapes after they are picked, either in the sun or in heated rooms, and while they are drying dipping them in a lye of wood ashes and barilla, of specific gravity 1.110, to every four gallons of which is added a pint of oil and a handful of salt; the effect of this is to cause a saccharine exudation to take place, which forms concretions upon the raisins and coats them with a thin varnish. The best raisins of this kind are hung on lines to dry in the sun, and as they begin to shrivel they are dipped in the lye once or twice and hung up again to complete the drying. The raisins known as sultana come from Smyrna; they are from a small grape without seeds, and come packed in drums. The black Smyrna raisins are also small, but have very large seeds, and are generally free from sugary concretions.—A very important variety of raisins are called currants, or Zante currants, and are popularly supposed to be common currants preserved in some manner; they are, however, produced by a very small-sized grape, largely cultivated at Patras, in Zante, Ithaca, and Cephalonia, and in the Grecian archipelago. The grapes are no larger than peas, and the bunches are only about 3 in. long. After drying in the sun, they are stored in large masses, which become so compact from the sugar which exudes from them, that they have to be forcibly dug apart for packing. For shipment

they are placed in casks, and made into a solid mass by treading. They were formerly called corinths, and are mentioned in old books as currans. The demand for them is very large in the United States.—Raisins are sometimes employed instead of grapes in making wine, and among the ancient Greeks and Romans some of the best wines were of this character.

RAJAHMUNDRY, or **Rajamahendri**, a town of British India, in the province and 280 m. N. N. E. of the city of Madras, capital of a district formerly of the same name, but now known as the district of Godavery; pop. between 15,000 and 20,000. It is on the N. bank of the Godavery river, here nearly two miles wide. The houses are mainly of mud, but one story high, and roofed with tiles.—The district (pop. in 1872, 1,584,179) includes the rich alluvial delta region of the Godavery, which has been made very prosperous by the existing system of irrigation. The chief products are rice, millet, maize, cotton, indigo, tobacco, and sugar cane. Coringa, at the mouth of the Godavery, is the principal port.

RAJPOOTANA (formerly **RAJASTHAN**), a territory of British India, consisting of 18 native states, principally inhabited by Rajpoots, in subsidiary alliance with the British government. This aggregation of states, which completely encloses the district of Ajmeer, extends E. and W. a distance of 520 m. between lon. 69° 35' and 78° 10' E., and N. and S. 480 m. between lat. 23° 15' and 30° 10' N. It is bounded N. by Bhawalpoor and the Punjaub; E. by the Northwest Provinces, the Chitore hills, and the river Chumbul, a tributary of the Jumna, beyond which lie the dominions of Sindia; S. by Malwa and Guzerat; and W. by Sinde. For purposes of British intervention and control the region is divided into seven political agencies, and the following table exhibits the area and population of the several states in each:

DIVISIONS.	Area in square miles.	Population.
Mewar Agency:		
Odeypoor or Mewar	11,614	1,161,400
Purtabgurb	1,460	150,000
Dongurpoor	1,000	100,000
Banswara	1,500	150,000
Jeympoor Agency:		
Jeympoor	15,000	1,900,000
Kishengurb	720	70,000
Bickaneer	17,676	539,000
Marwar Agency:		
Joodpoor or Marwar	86,672	1,783,600
Jessulmeer	12,252	70,000
Harattee Agency:		
Boondee	2,291	220,000
Kotah	5,000	433,400
Jhalawar	2,500	220,000
Tonk	1,890	182,000
Eastern States Agency:		
Dholepoor	1,626	500,000
Bhurtpoor	1,974	650,000
Kerowlee	1,260	140,000
Alwur (or Ulwur) Agency:		
Alwur	3,000	778,596
Serohee Superintendency:		
Serohee	3,000	55,000
Total	120,345	9,105,996

The Aravulli mountains are for the most part within the limits of Rajpootana, extending from Ajmeer southwesterly between Marwar and Mewar to Mt. Aboo, near the southern frontier of the country in the state of Serohee, where they attain a height of 5,650 ft. The regions of Marwar immediately W. of the range are watered by the river Loonee, which rises on its western slope and flows S. W. more than 200 m. into the runn of Cutch. Westward, beyond this river, a great part of Rajpootana is a sandy expanse of desert, extending from Joodpoor, the capital of Marwar, through Jessulmeer, the westernmost of the Rajpoot states. The towns scattered over this arid tract are situated in oases, and among them are some of the most salubrious and beautiful inhabited places in India. The state of Bickaneer, in the north, bordering upon Bhawalpoor, is also a dry and desolate region. Greater fertility prevails in the states which lie N. E. and E. of Ajmeer and the Aravulli range, and which are watered by the Chumbul and its tributaries, as well as by other affluents of the Jumna. Directly N. of Ajmeer, on the boundary between Jeympoor and Joodpoor, is the Sambhur salt lake, 22 m. long and 6 m. broad, which yields a valuable product of salt, the annual receipts from the Joodpoor portion being about £40,000. There are several smaller lakes in the country.—Of the 18 states of Rajpootana, 15 are occupied principally by Rajpoots; there are two Jat states, Dholepoor and Bhurtpoor; and the population of Tonk is Mohammedan. Each of the seven political agencies is under the charge of a British officer, who maintains constant political relations with the native ministers of state. The chief administrative and diplomatic authority for the entire territory is vested in a political agent of the viceroy, who resides at Ajmeer and on Mt. Aboo. An interjurisdictional court of wakils is held under the presidency of the Marwar agent, for the settlement of all disputes between the several states of Rajpootana. In March, 1873, the military force stationed in Rajpootana comprised 2,919 native infantry, 1,472 native cavalry, and 42 British officers.—The Rajpoots, by far the most numerous portion of the population, who claim to be descendants of the original Kshattriya caste of the Hindoos, appear to have inhabited the country from the earliest historical period. Notwithstanding their formidable resistance to the Mohammedan invasion, they became peaceful subjects of the earlier emperors, who treated their religion with tolerance; but in the time of Aurungzebe his oppressive measures induced them to take part in the war of the Mahrattas against him. Subsequently Rajpootana was invaded by various marauding armies, but in 1761 the Rajpoots had achieved practical independence both of the Mohammedans and of the Mahrattas. In the early part of the present century Sindia and Holkar exacted tribute from the chiefs, and the Pindarrees made re-

peated incursions into the country, which were so destructive that British intervention was necessary to save the people from ruin; and the principal Rajpoot states were transferred to the English, by the consent of their own rulers, in 1818, after the British forces had defeated Holkar and expelled the Pindarree robbers. A few were acquired earlier, and others subsequently. Their present political status is that of subject-allied states.—See Tod's "Annals and Antiquities of Rajasthan" (London, 1829), and Malletson's "Historical Sketch of the Native States of India" (1875).

RÁKÓCZY, a noble family of Transylvania, several members of which were princes of that country. Of these, **GEORGE I.** (1631-'48) made himself conspicuous by his coöperation with the Swedes in the latter years of the thirty years' war, when he succeeded in forcing the emperor Ferdinand III. to restore the liberties of Hungary by the treaty of Linz (1645). (See *Actes et documents pour servir à l'histoire de l'alliance de George Rákóczy avec les Français et les Suédois*, &c., by A. Szilágyi, Pesth, 1875.) His son **GEORGE II.** was less successful in a war with Poland (1657). The most celebrated member of the family, **FRANCIS II.**, grandson of the preceding, born in 1676, died at Rodosto, Turkey, April 8, 1735. After the death of his father, Francis I., and the surrender of Munkács to the Austrians after a heroic defence by his mother, he was brought up under the care of the court of Vienna, and during the insurrection under Tökölyi was placed under the Jesuits in Bohemia, who strove in vain to induce him to abjure Protestantism. Subsequently he received part of the estates of his relatives, and was permitted to reside in Hungary. Accused of being engaged in a conspiracy to excite rebellion, he was taken in May, 1701, to Austria, and confined in a dungeon at Wiener-Neustadt; but he escaped and fled to Poland, and in 1703 suddenly appeared in the vicinity of Munkács, collected an insurrectionary band, and issued a bitter manifesto against Austria. He was subsidized by Louis XIV., then engaged in the war of the Spanish succession, and after a short time had most of Hungary and Transylvania in his power, and even threatened Vienna. The revolted Hungarian districts and cities in 1705 formed a confederation similar to those of Poland, appointing Rákóczy, who had previously been elected prince of Transylvania, their chief with the title of *dux* (Hung. *vezér*). But in August, 1708, while investing Trentschin, he was surprised and badly defeated by the Austrian general Heister, and barely escaped. From this time the arms of Austria were in the ascendant, and her victories in the field were assisted by the dissensions which long before had manifested themselves among the confederates. Rákóczy having gone to Poland, in order to meet with Peter the Great of Russia, a peace was concluded in his absence between Austria and the confederates at Sztatmár in 1711. Af-

ter living several years in France and Spain, Rákóczy went to Turkey, and with other refugees passed the rest of his life at the castle of Rodosto on the sea of Marmora. He wrote a narrative of the struggle in Hungary under the title of *Mémoires sur les révolutions de Hongrie* (the Hague, 1738). He also composed meditations, hymns, soliloquies, and a commentary on the Pentateuch.

RAKOS. See PESTH.

RALE, or **Rasles**, Sébastien, a French missionary to the North American Indians, born in Franche-Comté in 1658, killed at Norridgewock, Maine, Aug. 12, 1724. He was a Jesuit, and taught Greek at a college in Nîmes. He embarked at La Rochelle, July 23, 1689, arrived in Quebec on Oct. 13, and was stationed successively at the Abenaki mission of St. Francis near the falls of the Chaudière, then in the Illinois country, and finally at Norridgewock on the Kennebec. He arrived here at least as early as 1695. The English settlers ascribed their quarrels with the Abenakis to his influence, accused him of instigating the forays of the savages upon the settlements along the coast, and set a price upon his head. A party of New Englanders under Capt. Hilton attacked Norridgewock in 1705, but withdrew after burning the church. A second expedition in 1722 pillaged his cabin and the church, which had been rebuilt, but the missionary escaped to the woods. Among the papers which they carried off was his dictionary of the Abenaki language, now preserved in the library of Harvard college, and printed in the memoirs of the American academy of arts and sciences, with an introduction and notes by John Pickering (4to, Cambridge, 1833). In 1724 a party of 208 men from Fort Richmond surprised Norridgewock, killed a number of the Indians, and shot Father Rale at the foot of the mission cross.—See a memoir of him by Convers Francis, D. D., in Sparks's "American Biography" (2d series, vol. vii.).

RALEIGH, a S. county of West Virginia, bounded E. by the Kanawha or New river, and watered by Coal river and other tributaries of the Kanawha; area, about 380 sq. m.; pop. in 1870, 3,673, of whom 16 were colored. The surface is mountainous. The chief productions in 1870 were 7,509 bushels of wheat, 73,657 of Indian corn, 16,278 of oats, 6,720 of potatoes, 5,769 lbs. of tobacco, 11,338 of wool, and 41,635 of butter. There were 827 horses, 3,357 cattle, 5,462 sheep, and 4,120 swine. Capital, Raleigh Court House.

RALEIGH, a city of Wake co., North Carolina, capital of the county and state, on the Raleigh and Gaston and the Raleigh and Augusta Air Line railroads, and on the North Carolina division of the Richmond and Danville railroad, 6 m. W. of the Neuse river, and 230 m. S. by W. of Washington; lat. 35° 47' N., lon. 78° 48' W.; pop. in 1850, 4,518; in 1860, 4,780; in 1870, 7,790, of whom 4,094 were colored. It is pleasantly situated on

an elevation, and is very regularly laid out. In the centre is a park of ten acres called Union square, from which extend four streets, 99 ft. wide, dividing the city into four parts, in each of which is a square of four acres. The state house is of granite, 166 ft. long and 90 ft. wide, and cost \$531,000. The old state house, containing Canova's statue of Washington, was burned in 1831. Other public buildings are the state geological museum, the state institution for the deaf and dumb and the blind, the state insane asylum, the state penitentiary, the county court house, and the county jail. The United States court house and post office, a fine granite building, is in course of erection (1875). The state supreme court and the United States circuit court for the eastern district of North Carolina are held here. There is a large trade in cotton and dry goods. The city contains the shops of the Raleigh and Gaston and Raleigh and Augusta Air Line railroads, two iron founderies, two cigar manufactories, a manufactory of pumps, two or three marble yards, several printing and binding establishments, and three national banks, with an aggregate capital of \$700,000. There are three hotels, two public halls, separate public schools for white and colored children, three female seminaries, under the management of the Baptists, Episcopalians, and Presbyterians respectively, several private schools, two libraries in the state house (the law library with 4,000 volumes, and the state library with 25,000 volumes), two daily, one semi-weekly, and nine weekly newspapers, and Baptist, Christian, Episcopal, Methodist, Presbyterian, and Roman Catholic churches.—The site of Raleigh having been selected as the seat of government in 1788, it was laid out in 1792 and incorporated as a city in 1794.

RALEIGH, or Raleigh, Sir Walter, an English courtier and navigator, born at Hayes, Devonshire, in 1552, beheaded at Old Palace yard, Westminster, Oct. 29, 1618. At the age of 17 he left Oriel college, Oxford, to join a troop sent to the aid of the Huguenots in France, and afterward served, it is said, in the Netherlands. On his return to England he found that his half brother, Sir Humphrey Gilbert, had just obtained a patent (1578) for establishing a plantation in America, and entered into the scheme. They put to sea in 1579; one of their ships was lost, the remainder, it is said, were crippled in an engagement with a Spanish fleet, and they returned without making land. The next year Raleigh served as captain against the Desmond rebellion in Ireland. On his return, it is said that he met the queen one day as she was walking, and spread his mantle over a miry place in the path for her to tread upon it. Struck by his gallantry, Elizabeth admitted him to court, loaded him with attentions, and employed him to attend the French ambassador Simier on his return to France, and afterward to escort the duke of Anjou to Antwerp. He soon made

use of his influence to promote a second expedition to America. Prevented by an accident from going in person, he left the command of the fleet to Sir Humphrey Gilbert, who sailed from Plymouth with five ships in 1583, and reached Newfoundland, of which he took possession in the name of the queen; but his ships were dispersed, and Gilbert himself on the voyage home was lost. Raleigh, obtaining from Elizabeth an ample patent and the title of lord proprietor over an extensive region, fitted out two vessels under the command of Philip Amidas and Arthur Barlow, who reached Ocracoke inlet on the shore of North Carolina in July, 1584. They explored Pamlico and Albemarle sounds, and returned to England in September with a glowing account of their discoveries. Elizabeth, as a memorial of her state of life, called the newly found region Virginia, and conferred knighthood upon Raleigh, with a lucrative monopoly of wines. Raleigh, now a member of parliament for Devonshire, obtained a bill confirming his patent, raised a company of colonists, and in 1585 sent out under command of Sir Richard Grenville seven vessels with 108 emigrants. The colony landed at Roanoke island about July 1, and Grenville soon returned home with the ships, capturing on his way a rich Spanish prize. In the mean time Raleigh had been appointed seneschal of the duchies of Devon and Cornwall and lord warden of the stannaries, and had obtained a grant of 12,000 acres of forfeited land in Ireland. His favor at court continued to increase, but among the multitude he was one of the most cordially hated persons in England. In 1586 two parties were sent out to Virginia with reinforcements, but they found the settlement abandoned. The disheartened colonists had gone home in Sir Francis Drake's ship, and the fruit of their expedition had been little more than the introduction into England of tobacco and potatoes. Raleigh now determined to found an agricultural state, and in April, 1587, despatched a considerable body of emigrants to make a settlement on Chesapeake bay. He granted them a charter of incorporation, and appointed a municipal government "for the city of Raleigh," intrusting the administration to John White, with 12 assistants. They founded their city not on the bay, but on the site of the former settlement at Roanoke island, and when their ship returned sent Gov. White back to England to expedite reinforcements. But two ships which Raleigh sent out with supplies fell into the hands of the French. His means were now exhausted, and the colonists all perished. Meanwhile Raleigh had exerted himself to assist the preparations for resisting an expected Spanish invasion; in 1587 he was a member of the council of war, and had command of the forces in Cornwall, of which county he was lieutenant general; and in 1588, when the great armada appeared in the channel, he hung upon its rear in a vessel of his

own, annoying it by quick and unexpected movements. He was in Drake's expedition to restore Dom Antonio to the throne of Portugal (1589), and captured some Spanish vessels intended for a fresh invasion of England. Visiting Ireland, he saw Edmund Spenser, with whom he had already contracted a friendship, and brought him to Elizabeth's court to present to her majesty three books of the "Faerie Queen." In the hope of shattering the power of Spain in the West Indies, he collected, mostly at his own expense, and sailed with a fleet of 13 vessels, and with Frobisher captured the largest Spanish prize that had ever been brought to an English port. Soon after this (1591) it was discovered that he had debauched one of the queen's maids of honor, the daughter of Sir Nicholas Throgmorton; and though he married the lady and lived with her happily till his death, such an offence was not to be overlooked. Imprisoned for two months and banished from court, he employed the period of his disgrace in planning an expedition to Guiana. He set sail with five ships in 1595, and returned the same year, after exploring a considerable extent of country about the Orinoco and destroying the Spanish settlement of San José. He published on his return a highly colored account of this voyage, in his "Discovery of the large, rich, and beautiful Empire of Guiana" (4to, 1596). He coöperated in the capture of Cadiz, was wounded, and was restored to the queen's favor. In 1597 he sailed under Essex against the Azores, and took Fayal, but quarrelled with his commander and returned. He had obtained a grant of the manor of Sherborne in Dorsetshire, which he magnificently embellished, was sent with Lord Cobham on a joint embassy to the Netherlands in 1600, and on his return was made governor of Jersey. The execution of Essex, which he was supposed to have had an agency in effecting, added greatly to the public odium with which he was regarded, and the death of Elizabeth in 1603 proved a final blow to his fortunes. On the accession of James he was stripped of his preferments, forbidden the royal presence, and shortly afterward arrested on charge of conspiring to place Lady Arabella Stuart on the throne. He made an attempt, probably feigned, to commit suicide. Convicted on the slightest evidence, after a rancorous speech from Attorney General Coke, he was reprieved and sent to the tower, and his estates were given to Carr, afterward earl of Somerset. During his 13 years' imprisonment he composed his "History of the World" (1614), a work greatly superior both in style and matter to the English historical compositions which had preceded it. For six years his wife was permitted to bear him company. At last, Villiers having supplanted Somerset in the royal favor, Raleigh was liberated in March, 1615, but not pardoned. Obtaining from James a commission as admiral of the fleet with ample privileges, he fitted out 14 ships, and reached Guiana with the loss of

two in November, 1617. Keymis was sent up the Orinoco with 250 men in boats, landed at the Spanish settlement of St. Thomas, and, in defiance of the peaceable instructions of James, killed the governor and set fire to the town. Raleigh's eldest son was killed in the action. Unable either to advance or to maintain their position, they retreated in haste to the ships, a Spanish fleet, which had been informed of their intended movements, hovering near them. Keymis, reproached for his ill success, committed suicide; many of the sailors mutinied; the ships scattered; and Raleigh landed at Plymouth in June, 1618, completely broken in fortune and reputation. He was soon arrested, and failing in an attempt, by feigning madness, to escape to France, was committed to the tower. The Spanish ambassador demanded his punishment, and James was not reluctant to grant it. The judges decided that, being still under judgment of death pronounced in 1603, he could not be tried again, and it was resolved to execute the former sentence.—Raleigh was a man of imposing person, dauntless courage, extensive knowledge, and varied accomplishments. His speeches show a knowledge of the principles of political economy far above his time. His literary productions, besides those already mentioned, include some short poems, "Maxims of State," "The Cabinet Council," "The Sceptic," and "Advice to his Son;" and he is also remembered in the world of letters as the founder of the "Mermaid club." His life has been written by William Oldys, Arthur Cayley (2 vols. 4to, London, 1805-'6), Mrs. A. T. Thomson (8vo, London, 1830), P. F. Tytler (Edinburgh, 1833), and Edward Edwards (2 vols., London, 1868). His poems were collected by Sir E. Brydges (London, 1814), his "Miscellaneous Writings" by Dr. Birch (2 vols., 1751), and his "Complete Works" were published at Oxford (8 vols., 1829).

RALLS, a N. E. county of Missouri, separated from Illinois by the Mississippi river, and intersected by Salt river; area, about 525 sq. m.; pop. in 1870, 10,510, of whom 1,255 were colored. The surface is broken or undulating, comprising prairie and timber land in nearly equal proportion. The soil is very fertile. The chief productions in 1870 were 158,728 bushels of wheat, 292,534 of Indian corn, 125,677 of oats, 15,740 of potatoes, 32,533 lbs. of wool, 127,793 of butter, and 8,962 tons of hay. There were 4,715 horses, 1,150 mules and asses, 3,668 milch cows, 11,470 sheep, and 16,660 swine. Capital, New London.

RALPH, James, an English author, born in Philadelphia, Pa., died in Chiswick, England, Jan. 24, 1762. He was a schoolmaster in Philadelphia, went to England in company with Benjamin Franklin in 1724, wrote "The Fashionable Lady, or Harlequin's Opera," performed in 1730, and altered several old plays. He attached himself to the faction of the prince of Wales, and on the accession of George III. received a pension, but only lived to enjoy it six

months. His only political work now remembered is an octavo volume defending the memory of Queen Mary and Queen Anne, in answer to the duchess of Marlborough's "Account of her Conduct." He continued anonymously Guthrie's history, under the title of a "History of England during the Reigns of King William, Queen Anne, and George I."

RALSTON, W. R. Shedden. See supplement.

RAM, Battering. See BATTERING RAM.

RAM, Water. See HYDRAULIC RAM.

RAMADAN, or Ramazan (the hot month, from Arab. *ramida*, to glow with heat), the ninth month of the Mohammedan year, during the whole of which a rigorous fast is commanded by the Koran, in commemoration of the first divine revelations received by the prophet. No one is allowed food or drink from sunrise until the appearance of the stars; and those who are unable to observe the ordinance on account of sickness, must fast during the month immediately succeeding their recovery. The Moslems compensate themselves for this rigor during the day by feasting at its close; and Ramadan is succeeded by three days of feasting called the little Bairam, the two corresponding to the Christian Lent and Easter. (See BAIRAM.)

RAMAYANA. See INDIA, RELIGIONS AND RELIGIOUS LITERATURE OF, vol. ix., p. 223.

RAMBOUILLET, a town of France, in the department of Seine-et-Oise, 30 m. S. W. of Paris; pop. in 1872, 4,725. It contains a palace built in the shape of a horse shoe, protected by ditches and flanked with five strong towers, in one of which Francis I. died. It is surrounded by beautiful gardens planned by Le Nôtre and a large park. The extensive forest adjoining was the favorite sporting ground of Charles X., who after the triumph of the revolution of July, 1830, in Paris, made an ineffectual show of resistance here. A school for daughters of officers was established in the palace in 1852.

RAMBOUILLET, Catherine de Vivonne, marchioness de, a French leader of society, born in Rome in 1588, died in Paris, Dec. 2, 1665. Her father was Jean de Vivonne, marquis of Pisani, French ambassador in Rome, and her mother was a Roman lady. At an early age she married Charles d'Angennes, afterward marquis de Rambouillet. After arriving in Paris she was shocked by the immorality and puerility of the court circles, gathered round her a select society, and fitted up the hôtel Rambouillet with a special view to its convenience for literary reunions. Here she dispensed generous hospitality for half a century alike to authors, wits, and persons of rank, who now for the first time met on a footing of equality. Her daughter Julie, afterward duchess de Montausier, was the idol of her guests, of whom the women were called *les précieuses*, and assumed classical and romantic names. The conversational brilliancy which ever afterward distinguished the great saloons of Paris originated

here, and the French academy took its rise from one of the literary reunions which grew out of those at the hôtel Rambouillet. Voiture, one of the original members of the academy, was the most assiduous and popular habitué of the house; Corneille and Bossuet first came into notice here; Descartes found here warm admirers; Balzac, La Rochefoucault, Malherbe, Mme. de Sévigné, and hosts of other distinguished persons were among the visitors. During the first half of the 17th century these gatherings exerted a noble influence on the French language and literature, but subsequently declined, chiefly owing to the mannerism of Mlle. de Scudéry and other ladies, and never recovered from the effect of Molière's comedy *Les précieuses ridicules* (1659), though this was aimed particularly against numerous extravagant offshoots of the hôtel Rambouillet.—See *Mémoires pour servir à l'histoire de la société polie en France pendant le dix-septième siècle*, by Roederer (Paris, 1835), and *Précieux et précieuses*, by Charles Livet (1859).

RAMEAU, Jean Philippe, a French composer, born in Dijon, Oct. 25, 1683, died in Paris, Sept. 12, 1764. He was the son of an organist, and was educated for the bar, but at the age of 18 went to Italy as a violinist. He returned to Paris in 1717, and was organist in several churches. He composed anthems, cantatas, and pieces for the organ and the harpsichord, published a *Traité de l'harmonie* (1722) and *Nouveau système de musique théorique* (1726), and composed the music for several of Piron's and Voltaire's comedies and other pieces, the best being that to Pellegrin's *Hippolyte et Aricie* (1733). His numerous operas and theoretical writings are now obsolete.

RAMESSES, or Ramses, the name of 14 or 15 Egyptian kings of the 19th and 20th dynasties, called collectively the Ramessids. Rameses I. was the first monarch of the 19th dynasty, beginning, according to Mariette, about 1460 B. C. He was succeeded by Seti I. Rameses II., son of Seti I., was one of the greatest of Egyptian kings, and a detailed account of his reign, as well as of that of Rameses III., in many respects an equally eminent ruler, is given in the article EGYPT, vol. vi., p. 462. Very little is known of the reigns of the others.

RAMIE, one of the East Indian names, and the one generally adopted in this country, for the plant producing the fibre called China grass. Its botanical name is *Bahmeria nivea*, and it is found either cultivated or wild throughout the greater part of tropical and eastern Asia; the genus (named after G. R. Böhmer, a Wittenberg botanist of the last century) belongs to the *urticaceæ* or nettle family, and is nearly related to the true nettles; but the plants are not armed with stings, and the fertile flowers, instead of a two- to five-parted calyx (see NETTLE), have a tubular calyx, which closely surrounds the small nut-like fruit; one species, a coarse nettle-like weed (*B. cylindrica*), is very common in moist shady places in

most parts of the United States. The ramie is a perennial, somewhat shrubby plant, growing 4 ft. high, and throwing up numerous stems as thick as the little finger, which bear opposite, pointed, serrate leaves, 6 in. long by 4 in. broad, on long hairy petioles; their upper surface is



Ramie (*Boehmeria nivea*).

dark green, but underneath they are covered with a very white down, suggesting the specific name *nivea*, snowy, which makes the contrast between the two surfaces very marked. The inconspicuous flowers are in little clusters upon axillary stalks. A variety, *candicans*, which has been called *B. tenacissima*, is cultivated in the same countries as the type, from which it differs in being more robust and in having the under surface of the leaves scarcely whitened. The useful portion is the fibre of the inner bark, which in eastern countries is stripped from the stems in two long pieces, cleared of extraneous matter, dried, and assorted according to the fineness of the fibre, which depends in great measure upon the rapidity with which the plant grew. For weaving, the fibres, after being bleached, are slowly picked apart by the fingers into threads coarser or finer according to the intended fabric. This plant has been used in China and other eastern countries from time immemorial to make a great variety of fabrics, some having the fineness and brilliancy of silk; the woven material was early an article of commerce, and considerable quantities of the fibre are now imported by England and France and used as a substitute for or to mix with silk. In warm countries three crops of stems are obtained in the year, the second affording the finest fibre; it may be raised from seed, but the usual method is to divide up the old plants; the sets are planted in rows, about 5 ft. apart, and very thickly in the rows, as straight stems are obtained only when they are crowded. It needs a rich and well drained soil, and a climate

where there are no hard frosts; in northern China the planters take up the roots and keep them in pits over winter. The proper time for cutting is indicated by the turning brown of the stems at the base. The plant was introduced into Jamaica in 1854, and in 1855 was sent to the botanic garden at Washington; but no serious attempt was made to engage in its culture till 1867, when an excitement like that formerly caused by *morus multicaulis* seemed imminent. On account of the deranged condition of labor southern planters were eager for any crop which could be raised with less manual labor than cotton; great stories were told of the productiveness and profit of ramie, and a lot of plants brought from Mexico, where it had been introduced a few years before, were sold at high prices. For a few years those who raised plants for sale found it profitable, but when the product became considerable the heretofore unconsidered problem of the disposal of the crop came up; to prepare the fibre in the eastern manner by hand was impossible, and the crude material was too bulky for export. Machines were invented for separating the fibre without encouraging success, and the excitement subsided.—The seeds of the wood nettle, *Laportea Canadensis*, a tall, coarse, stinging, nettle-like plant, have been offered as those of the “American ramie.”

RAMILLIES, or **Ramilles**, a village of Belgium, in the province of South Brabant, 16 m. S. by E. of Louvain, noted for a brilliant victory achieved here, May 23, 1706, by Marlborough at the head of English, Dutch, and Danish troops, over the French and Bavarians under Marshal Villeroi. France speedily surrendered almost all her possessions in the Spanish Netherlands, Marlborough expressing astonishment “that the enemy should give up a whole country with so many strong places without the least resistance.”

RAMISSERAM, or **Rameswar**, an island between Ceylon and the continent of India, at the W. extremity of the chain of rocks and sand banks, called Adam's Bridge, that stretch across from Ceylon and separate Palk strait from the gulf of Manaar. The island is of irregular shape, about 12 m. long and 6 m. broad. It is separated from the mainland by the Pamban passage, which has been improved and deepened by the British government, until its depth at low water now ranges from 11 to 14 ft. Several schemes for the construction of a ship canal across the W. end of the island itself are under consideration. The surface is generally low, and there are tracts of considerable extent covered by swamps. It is well watered, and there is a fresh-water lake nearly 3 m. in circumference. It has on its E. side, in lat. 9° 15' N., lon. 79° 20' E., a town of the same name, containing about 1,000 houses and a magnificent pagoda built of immense blocks of granite; its inhabitants are principally Brahmans. The island is looked upon as a place of great sanctity by the Hindoos, and pilgrimages are

undertaken to it from the most distant parts of India, the annual number visiting the great pagoda being estimated at 30,000.

RAM MOHUN ROY, rajah, a Hindoo scholar, born in the district of Burdwan, Bengal, about 1774, died near Bristol, England, Sept. 27, 1833. His family were strict Brahmans, but having studied the Koran he early renounced polytheism. In 1803, after the death of his father, Ram Mohun Roy published several pamphlets in the native and foreign languages, to show that the Brahmans had fallen away from their original faith, for which an attempt was made to deprive him of caste. He translated into Bengalee and Hindostanee the Vedanta, or body of Hindoo theology as contained in the Vedas, afterward prepared an abridgment of it, and in 1816 translated the abridgment into English. In conjunction with two other natives he published the "Bengal Herald," an English newspaper, and in 1820 published in English, Sanskrit, and Bengalee a series of selections from the New Testament, entitled "The Precepts of Jesus the Guide to Peace and Happiness." In this he advanced Unitarian opinions, which involved him for several years in controversy with Dr. Marshman and other missionaries. He believed in the divine mission of Christ, and considered Christianity consistent with Brahmanism. He distinguished himself by his exertions to abolish the practice of suttee, or female immolation. In 1830 he was accredited to the British court by the titular sovereign of Delhi, to make a representation of grievances, and was successful in his mission. He visited England twice, and was buried there.

RAMORINO, Girolamo (according to some, properly GIOVANNI PIETRO REMORINO), a military adventurer, born in Genoa about 1792, executed in Turin, May 22, 1849. He was a natural son of a French officer, entered the ranks of the French army, and in the campaign of 1809 against Austria served as a common soldier, and in that of 1812 against Russia as captain of artillery. In 1815 the emperor appointed him officer of ordnance, and after the second restoration he retired to Savoy. He was one of the leaders of the insurrection in Piedmont in 1821. After the failure of the movement he fled to France, and at the beginning of the Polish insurrection of 1830 hastened to Warsaw to offer his services. He was first made colonel, and then general of a corps with which he gained numerous advantages, and his success alone saved him from the condemnation of a court martial on account of his frequent disobedience of orders. After the fall of Warsaw he went to France. In 1834 he commanded in the invasion of Savoy planned by Mazzini. At the beginning of Charles Albert's second campaign, in 1849, Chrzanowski placed him at the head of the fifth division, with orders to prevent the advance of the enemy from Pavia. Ramorino, mistaking the design of the Austrians, left the N. bank of the Po unde-

fended and the direct road from Pavia to Turin open. The fatal issue of the battle of Novara, March 23, 1849, was the consequence. He was deprived of his command, arrested at Arona by the national guards, tried before a court martial on a charge of insubordination, and sentenced to be shot. He justified his course on the ground of the feebleness of his division, which rendered it impossible for him to prevent the advance of the Austrian army.

RAMSAY. I. Allan, a Scottish poet, born at Leadhills, Lanarkshire, Oct. 15, 1686, died in Edinburgh, Jan. 7, 1758. He was originally a wig maker in Edinburgh, and his first poem was written at the age of 26. He subsequently published on single or half sheets many poems on local or familiar topics. His first poem of considerable length was a continuation of King James's "Christ's Kirk on the Green" (1716). About this time he became a bookseller, being at the same time an industrious editor and author. In 1721 appeared a 4to edition of his collected poems. This was succeeded by his "Fables and Tales," "The Fair Assembly," "Health," a poem inscribed to the earl of Stair, and the "Tea Table Miscellany" (4 vols., 1724), a collection of songs, Scottish and English, which passed through 12 editions in a few years. His most important work was "The Gentle Shepherd" (1725), portions of which had appeared in his first volume of poems. He now removed to a larger shop, which soon became the resort of the wits and literary men of Edinburgh, and in which he established the first circulating library ever opened in Scotland. His last original work of importance was a collection of fables (1730). He retired from business in 1755. A complete edition of his poems, with a biography by George Chalmers, was published in 2 vols. 8vo in 1800 (new ed., with an essay on Ramsay's genius by Lord Woodhouslee, Paisley, 1874). **II. Allan**, a portrait painter, son of the preceding, born in Edinburgh in 1718, died in Dover, Aug. 10, 1784. He was a man of literary culture, settled in London, and was a visitor at the house of Dr. Johnson. Though raised to a momentary rivalry with Sir Joshua Reynolds, his works are not above mediocrity.

RAMSAY, Andrew Crombie, a British geologist, born in Glasgow, Jan. 31, 1814. He was early connected with the geological survey of Great Britain, of which he became a director in 1845, and director general in 1872. He was appointed professor of geology at University college, London, in 1848, and at the royal school of mines in 1851, which latter office he still holds (1875). He was president of the geological society in 1862-'3, and in 1872 succeeded Sir Roderick Murchison as director general of the museum of practical geology. His works include "The Geology of Arran" (1841); "Geology of North Wales" (1858); "Geological Map of England and Wales" (1859); "The Old Glaciers of North Wales and Switzerland"

(1860); "Physical Geology and Geography of Great Britain" (1863; 4th ed., 1875); and vol. v. of the "Geological Survey of Great Britain" (1856-'66), comprising "Geology of Wiltshire and Gloucestershire." He has in preparation (1875) a work on the formation of hills and valleys, to be entitled "Earth Sculpture."

RAMSAY, Andrew Michael, known as the chevalier de Ramsay, a Scottish author, born in Ayr in 1686, died in St. Germain-en-Laye, France, May 6, 1743. He was educated at the university of Edinburgh, afterward resided for six months with Fénelon at Cambrai, became a Roman Catholic, and was appointed tutor to the duke de Château-Thierry and afterward to the prince de Turenne. Subsequently he had charge for a year at Rome of the education of the two sons of the pretender. He revisited Scotland in 1725, and for several years was an inmate of the family of the duke of Argyll. Returning to France, he was intendant of the prince de Turenne till his death. His largest work is "On the Principles of Natural and Revealed Religion" (2 vols. 4to, Glasgow, 1749). His *Voyages de Cyrus* (2 vols. 8vo, Paris and London, 1727), by which he is best known, is a palpable imitation of the *Télémaque* of Fénelon. It was translated into English by Nathaniel Hooke. He also wrote a biography of Fénelon (the Hague, 1723), and one of Marshal Turenne (Paris, 1735), both translated into English.

RAMSAY, David, an American historian, born in Lancaster co., Pa., April 2, 1749, assassinated in Charleston, S. C., May 8, 1815. In 1773 he settled as a physician in Charleston. He took the field as a surgeon at the outbreak of the revolution, was a member of the South Carolina legislature, and of the privy council or council of safety, and after the capture of Charleston he was included among several inhabitants of that place who were held in close confinement at St. Augustine as hostages. From 1782 to 1786 he was a member of congress from the Charleston district, and for a year was president of that body. He was shot in the street by a lunatic, to whose insanity he had testified. In 1785 he published his "History of the Revolution in South Carolina," and in 1789 his "History of the American Revolution." Both were republished in Europe, and were translated into French. In 1801 he published a "Life of Washington," and in 1809 a "History of South Carolina" (2 vols. 8vo). His "History of the United States," from their settlement as English colonies to the close of 1808, was continued to the treaty of Ghent by the Rev. S. S. Smith and others (3 vols. 8vo). This was included in his "Universal History Americanized" (12 vols. 8vo, 1816-'19), purporting to give a historical view of the world from the earliest records to the 19th century. Among his minor works was a "History of the Congregational Church in Charleston" (1815).

RAMSAY, Edward Bannerman, a Scottish author, born at Balmain, Kincardineshire, Jan.

31, 1793, died in Edinburgh, Dec. 27, 1872. He graduated at St. John's college, Cambridge, in 1815, was a curate of the established church in Somersetshire for seven years, became minister of St. John's church in Edinburgh in 1830, and in 1841 dean of the Reformed Episcopal church in Scotland. He delivered in 1862 before the philosophical institute of Edinburgh two lectures on the "Genius and Works of Handel," and in 1866 two lectures on "Preachers and Preaching," which have been published in book form. His best known publication is his "Reminiscences of Scottish Life and Character" (Edinburgh, 1857), which in 1872 had passed through 19 editions. His "Manual of Catechising" (1859) has had 11 editions. He also published memoirs of Sir J. E. Smith (1827) and of Dr. Chalmers (1867); "Advent Sermons" (1850); "Diversities of Christian Character" (1858); "The Christian Life" (1859); "On the Canon Law of the Episcopal Church of Scotland as it stood in 1860" (1860); "Christian Responsibility" (1864); and "Pulpit Table Talk" (1868).

RAMSDEN, Jesse, an English instrument maker, born at Salterhebble, near Halifax, Yorkshire, in 1735, died in Brighton, Nov. 5, 1800. He was at first a cloth dresser, but in 1758 bound himself to an instrument maker in London, and he early opened a shop of his own. He improved the construction of the sextant so as to reduce the limit of error from 5' to 30". He married the daughter of Dollond, and acquired a part of Dollond's patent for achromatic telescopes. The telescopes erected by him at the observatories of Blenheim, Mannheim, Dublin, Paris, and Gotha were remarkable for the superiority of their object glasses. One of his most celebrated productions was a dividing machine of great perfection. By his will a large portion of his fortune was distributed among his workmen. He was a fellow of the royal society, and of the imperial academy of St. Petersburg.

RAMSES. See RAMESES.

RAMSEY. I. An E. county of Minnesota, bordered S. W. and S. by the Mississippi river; area, about 200 sq. m.; pop. in 1870, 22,886. It has an elevated surface, with prairies and forests. It is intersected by several railroads centring in St. Paul. The chief productions in 1870 were 54,321 bushels of wheat, 38,020 of Indian corn, 53,868 of oats, 9,015 of barley, 5,600 tons of hay, 1,500 lbs. of wool, and 91,185 of butter. There were 618 horses, 1,099 milch cows, 298 sheep, and 1,357 swine; 9 manufactories of carriages and wagons, 5 of furniture, 3 of dressed furs, 4 of machinery, 6 of saddlery and harness, 3 of sash, doors, and blinds, 3 of soap and candles, 3 of tin, copper, and sheet-iron ware, 1 tannery, 2 flour mills, 2 saw mills, and 4 distilleries. Capital, St. Paul, which is also the capital of the state.

II. A N. E. county of Dakota, recently formed and not included in the census of 1870; area, about 1,500 sq. m. Stump lake is in the S.

part, and the S. W. corner is occupied by a portion of Miniwakan or Devil's lake. The surface is rolling prairie.

RAMSGATE, a seaport of Kent, England, at the S. E. corner of the isle of Thanet, 67 m. E. by S. of London; pop. in 1871, 14,640. The older part of the town lies in a natural hollow, while the newer portions occupy the high ground on either side, have a fine sea view, and contain many handsome houses. The harbor is artificial, and nearly circular, comprising an area of 48 acres, and including a dry dock and ship railway. Ship building and rope making are carried on. Ramsgate is a dependency of Sandwich, and a fashionable watering place.

RAMUS, Joseph Marius, a French sculptor, born in Aix, June 19, 1805. He studied at the school of fine arts in Paris, and was sent to copy mediæval sculptures in the galleries of Florence. Among his works are statues of Lafontaine, Anne of Austria, St. John, Philippe of Champagne, and Judith. One of his finest is "David fighting Goliath." Many of his works are at Versailles and in the Luxembourg.

RAMUS, Peter (PIERRE DE LA RAMÉE), a French logician, born at Cuth, Picardy, in 1515 or 1502, killed in the massacre of St. Bartholomew at Paris, Aug. 24, 1572. At the age of 12 he entered the college of Navarre at Paris as a servant, and made rapid progress. When he presented himself for examination for the degree of master of arts in 1536, the subject of his exercise was: *Quæcumque ab Aristotele dicta esse commenticia esse* ("All that has been affirmed by Aristotle is a fabrication"), and he maintained it with so much skill that he was admitted to his degree. He afterward taught in the college of Ave Maria, and in 1543 published *Institutiones Dialecticæ et Animadversiones in Dialecticam Aristotelis*. These books were attacked by the officers of the university of Paris, and the author was represented as impious and seditious, and as aiming to destroy all science and religion under the pretence of assailing Aristotle. To settle the quarrel between the advocates of the rival systems of logic, Francis I. ordered a trial in which two of the judges were nominated by Ramus, two by Govea, his chief accuser, and one by the king. After a hearing, Ramus was condemned on March 1, 1544, as having "acted rashly, arrogantly, and impudently;" he was prohibited from teaching and his books were suppressed. Soon after he lectured on rhetoric at the college of Presles, and in 1545 was permitted to resume teaching in Paris. He began a course of mathematics, which was continued till 1551, when Henry II. appointed him professor of philosophy and eloquence. In 1561 he embraced Protestantism, and in July, 1562, he was forced to flee, but was offered by Charles IX. a refuge at Fontainebleau, his house having been pillaged and his library destroyed during his absence. In 1563 he returned to Paris, and for a time occupied the professor's

chair; but in 1568 he received permission to travel. He once more returned in 1571. His followers were called Ramists or Rameans. A catalogue of his works is contained in *Ramus, sa vie, ses écrits et ses opinions*, by Waddington-Kastus (8vo, Paris, 1855).

RAMUSIO, Giambattista, an Italian author, born in Treviso in 1485, died in Padua, July 10, 1557. He was secretary of the council of ten in Venice, travelled as ambassador through France, Switzerland, and Italy, and was author of *Raccolta di navigazioni e viaggi* (3 vols., 1550-'59), a collection of voyages and travels in ancient and modern times. He left materials for a fourth volume, but they were destroyed by fire in 1557. The best edition is that of 1606.

RANCÉ, Armand Jean Le Bouthillier de, reformer of the monastery of La Trappe, born in Paris, Jan. 9, 1626, died Oct. 27, 1700. He was a godson of Cardinal Richelieu, and at the age of 12 published an edition of Anacreon, with notes and comments. Though ordained a priest in 1651, he led a dissipated life, and was an assiduous visitor at the hôtel Rambouillet, where he fell in love with the duchess de Montbazou. After her death he submitted himself to severe penances, gave his property to the poor, and resigned all his benefices except the abbey of La Trappe, to which he retired in 1662. Impressed with the necessity of a reform in monastic life, he went to Rome in 1664 to obtain from the pope permission to enforce in France the rules of the former "strict observance of Cîteaux." He failed in his mission, but on his return in 1666 he introduced the most rigorous regulations into his own community. In 1683 he published a treatise *De la sainteté et des devoirs de la vie monastique*, and in 1690 assumed the spiritual direction of the convent of Les Claires, a female community dependent on that of La Trappe, and composed his *Réflexions sur les quatre évangélistes*. In 1695, having brought on a severe disease by his austerities, he resigned his abbacy and remained a private monk in the convent, redoubling his penances, and finally breathing his last upon a bed of straw and ashes. His life was written by his contemporaries Maupeau, Marsollier, and Lenain de Tillemont, by Chateaubriand (Paris, 1844), and by C. Butler (London, 1814).

RANDALL, Samuel Jackson. See supplement.

RANDOLPH, the name of counties in eight of the United States. **I.** A N. E. county of West Virginia, drained by the sources of the Monongahela river; area, about 1,200 sq. m.; pop. in 1870, 5,563, of whom 103 were colored. A range of the Alleghanies runs along its E. border, and several parallel ranges extend within its limits; the soil in the valleys is fertile. Coal, iron, salt, limestone, and other minerals abound. The chief productions in 1870 were 8,969 bushels of wheat, 59,758 of Indian corn, 33,237 of oats, 7,298 tons of hay, 17,706 lbs. of wool, 90,840 of butter, and 3,603 gallons of

sorghum molasses. There were 1,525 horses, 1,970 milch cows, 6,503 other cattle, 8,523 sheep, and 2,834 swine. Capital, Beverly. **II.** A central county of North Carolina, drained by Deep river and by the Uharie, a tributary of the Yadkin; area, 725 sq. m.; pop. in 1870, 17,551, of whom 2,606 were colored. The surface is rolling and the soil generally fertile. The chief productions in 1870 were 137,427 bushels of wheat, 264,924 of Indian corn, 95,681 of oats, 18,880 of Irish and 23,125 of sweet potatoes, 24,399 lbs. of tobacco, 26,050 of wool, 121,618 of butter, and 4,346 tons of hay. There were 2,844 horses, 772 mules and asses, 4,787 milch cows, 839 working oxen, 6,290 other cattle, 17,101 sheep, and 23,387 swine. Capital, Ashborough. **III.** A S. W. county of Georgia, separated from Alabama by the Chattahoochee, intersected by Pataula creek, and drained by branches of Flint river; area, about 400 sq. m.; pop. in 1870, 10,561, of whom 5,477 were colored. It has a nearly level surface, and a very fertile soil in the river bottoms. It is traversed by the Southwestern railroad of Georgia. The chief productions in 1870 were 184,940 bushels of Indian corn, 25,457 of sweet potatoes, 5,748 bales of cotton, 2,215 lbs. of wool, and 9,165 gallons of molasses. There were 574 horses, 962 mules and asses, 1,553 milch cows, 2,803 other cattle, 1,143 sheep, and 9,540 swine. Capital, Cuthbert. **IV.** An E. county of Alabama, bordering on Georgia, intersected by the Tallapoosa river; area, about 600 sq. m.; pop. in 1870, 12,006, of whom 1,641 were colored. It has an uneven surface and a generally fertile soil. Gold is found. The chief productions in 1870 were 48,587 bushels of wheat, 264,448 of Indian corn, 20,707 of oats, 37,758 of sweet potatoes, 2,246 bales of cotton, 7,667 lbs. of tobacco, 13,262 of wool, 125,066 of butter, and 8,188 gallons of cane and 4,804 of sorghum molasses. There were 1,313 horses, 845 mules and asses, 3,062 milch cows, 1,751 working oxen, 5,047 other cattle, 7,485 sheep, and 14,819 swine. Capital, Wedowee. **V.** A N. E. county of Arkansas, bordering on Missouri and drained by branches of Black river; area, about 850 sq. m.; pop. in 1870, 7,466, of whom 357 were colored. Its surface is generally level and the soil fertile. It is intersected by the Cairo and Fulton railroad. The chief productions in 1870 were 16,733 bushels of wheat, 265,990 of Indian corn, 18,293 of oats, 11,130 lbs. of tobacco, 7,643 of wool, and 57,450 of butter. There were 757 horses, 1,472 milch cows, 2,706 other cattle, 2,507 sheep, and 8,658 swine. Capital, Pochontas. **VI.** An E. county of Indiana, bordering on Ohio, and drained by White, Mississinewa, and Whitewater rivers; area, about 400 sq. m.; pop. in 1870, 22,862. It has an undulating surface and fertile soil. It is intersected by several railroads. The chief productions in 1870 were 535,003 bushels of wheat, 740,051 of Indian corn, 147,992 of

oats, 10,088 of flax seed, 9,208 tons of hay, 73,019 lbs. of wool, 349,327 of butter, and 36,914 gallons of maple molasses. There were 8,485 horses, 6,094 milch cows, 8,571 other cattle, 25,154 sheep, and 32,590 swine; 5 manufactories of carriages and wagons, 9 of furniture, 2 of wagon material, 1 of woollen goods, 4 tanneries, 7 flour mills, and 19 saw mills. Capital, Winchester. **VII.** A S. W. county of Illinois, separated from Missouri by the Mississippi river, intersected by the Kaskaskia, and drained by several small streams; area, about 500 sq. m.; pop. in 1870, 20,859. It has an undulating and hilly surface and a generally fertile soil. It is intersected by the St. Louis, Belleville, and Southern Illinois, and the Chester and Tamaroa railroads. The chief productions in 1870 were 1,031,472 bushels of wheat, 510,080 of Indian corn, 414,487 of oats, 107,049 of Irish and 11,362 of sweet potatoes, 11,097 tons of hay, 3,572 lbs. of tobacco, 35,731 of wool, 109,184 of butter, and 42,345 gallons of sorghum molasses. There were 6,972 horses, 1,209 mules and asses, 4,619 milch cows, 5,351 other cattle, 12,180 sheep, and 24,590 swine; 2 manufactories of agricultural implements, 19 of carriages and wagons, 10 of saddlery and harness, 3 of woollen goods, 3 breweries, 10 flour mills, and 4 saw mills. Capital, Chester. **VIII.** A N. county of Missouri, intersected by the E. fork of Chariton river and drained by several other streams; area, about 450 sq. m.; pop. in 1870, 15,908, of whom 2,134 were colored. It has a nearly level surface and a very fertile soil. It is intersected by the St. Louis, Kansas City, and Northern railroad. The chief productions in 1870 were 82,538 bushels of wheat, 22,361 of rye, 594,372 of Indian corn, 209,013 of oats, 7,929 tons of hay, 873,776 lbs. of tobacco, 63,623 of wool, 150,737 of butter, 22,435 of honey, and 15,169 gallons of sorghum molasses. There were 7,155 horses, 2,203 mules and asses, 4,380 milch cows, 7,133 other cattle, 21,770 sheep, and 25,714 swine; 3 flour mills, and 6 saw mills. Capital, Huntsville.

RANDOLPH, Edmund, an American statesman, son of John and nephew of Peyton Randolph, born in Virginia, Aug. 10, 1753, died in Frederick co., Va., Sept. 12, 1813. He is said to have been disinherited by his father, who was an intense royalist. In 1775 he served on the staff of Washington. He was a delegate to the Virginia convention in May, 1776, and from 1779 to 1783 he was a member of the continental congress. In 1787 he was a member of the constitutional convention, and introduced what was called the "Virginia plan." He refused to sign the constitution, though he afterward advocated its adoption in the Virginia convention. In 1788 he was governor of Virginia, and in 1789 was appointed attorney general of the United States. In January, 1794, he succeeded Jefferson as secretary of state; but having been accused of an intrigue with the French envoy, he resigned in

August, 1795. He published "A Vindication" (Philadelphia, 1795).

RANDOLPH, John, of Roanoke, an American orator, born at Cawsons, Chesterfield co., Va., June 2, 1773, died in Philadelphia, June 24, 1833. He was educated at Princeton, at Columbia college, New York, and at the college of William and Mary, and studied law at Philadelphia, but never practised. In 1799 he was elected a representative in congress, and soon became conspicuous, in the language of Hildreth, as "a singular mixture of the aristocrat and the Jacobin." He was reelected in 1801, and was made chairman of the committee of ways and means. In 1803, as chairman of a committee, he reported against a memorial from Indiana for permission to introduce slaves into that territory in spite of the prohibition of the ordinance of 1787, which he pronounced to be "wisely calculated to promote the happiness and prosperity of the northwestern country." In 1804 he was chief manager in the trial of Judge Chase, impeached before the senate. (See CHASE, SAMUEL.) In 1806 he assailed President Jefferson and his supporters with great virulence. He attacked Madison's administration, and opposed the declaration of war against Great Britain in 1812. His opposition caused his defeat at the next election. He was reelected in 1814, and again in 1818, having declined to be a candidate in 1816. In the congress of 1819-'20 he opposed the Missouri compromise, stigmatizing the northern members by whose coöperation it was carried as "doughfaces," an epithet adopted into the political vocabulary of the United States. In 1822, and again in 1824, he visited England. From 1825 to 1827 he was a senator of the United States, and during that time fought a duel with Mr. Clay. (See CLAY, HENRY.) He supported Gen. Jackson for president in 1828. In 1829 he was a member of the convention to revise the constitution of Virginia, and in 1830 was appointed minister to Russia; but soon after his reception by the emperor Nicholas, he departed abruptly for England, where he remained for nearly a year, and returned home without revisiting Russia. He was again elected to congress, but was too ill to take his seat. Exhausted with consumption, he died in a hotel at Philadelphia, whither he had gone on his way to take passage again across the ocean. During his life his speeches were more fully reported and more generally read than those of any other member of congress. He was tall and slender, with long, skinny fingers, which he was in the habit of pointing and shaking at those against whom he spoke. His voice was shrill and piping, but under perfect command and musical in its lower tones. His invective, sarcasm, and sharp and reckless wit made him a terror to his opponents in the house. At the time of his death he owned 318 slaves, whom by his will he manumitted, bequeathing funds for their settlement and maintenance in a free state. His "Letters

to a Young Relative" appeared in 1834.—See "Life of John Randolph," by Hugh A. Garland (2 vols. 8vo, New York, 1850).

RANDOLPH, Peyton, an American patriot, president of the first congress, born in Virginia in 1723, died in Philadelphia, Oct. 22, 1775. He was the second son of Sir John Randolph, and after graduating at the college of William and Mary went to England and studied law at the Temple. In 1748 he was appointed king's attorney general for the colony, was chosen a member of the house of burgesses, and was chairman of a committee to revise the laws of the colony. In 1764 he drew up the address of the burgesses to the king against the passage of the stamp act. In 1765, after that act became a law, Randolph with other proprietors of large estates opposed Patrick Henry's celebrated five resolutions. (See HENRY, PATRICK.) In the same year Virginia forwarded to England petitions similar to those adopted by the congress, with an address to the king written by Randolph. In 1766 Randolph was made speaker of the house of burgesses, resigning about the same time his office of attorney general. In the measures of opposition to the English government he now took a conspicuous part. He was a member of the committee of vigilance appointed to obtain the most accurate intelligence of all acts of parliament affecting the rights of the colonies, and to open a correspondence with the other colonies. In August, 1774, he presided in the convention at Williamsburg, and was one of the delegates elected to the continental congress. On the assembling of that body in Philadelphia in September, he was unanimously elected its president, but in consequence of ill health held that post only five or six weeks. In 1775 he presided over the second convention of Virginia at Richmond, was elected again as a delegate to congress, and when that body met at Philadelphia on May 10, 1775, was reelected president; but the duties of speaker of the house of burgesses recalling him to Virginia, he was succeeded by John Hancock. He died suddenly of apoplexy.

RANDOLPH MACON COLLEGE, an institution of learning at Ashland, Hanover co., Va., 16 m. N. of Richmond, on the Richmond, Fredericksburg, and Potomac railroad. It was founded by a resolution of the Virginia conference of the Methodist Episcopal church in 1827, the charter was obtained in 1830, and the college began work in Mecklenburg co., Va., near the North Carolina border, in 1832. In 1852 an endowment of \$100,000 was secured, but this was lost for the most part during the civil war. In 1866 the college was removed to its present site. The course of study is distributed into separate schools, of Latin, Greek, English, &c., the principal schools being arranged in four courses of one year each. Degrees are conferred for graduation in each school; for graduation in a certain number of schools the degree of B. S. or A. B. is given, and for gradu-

ation with distinction that of A. M. There is a school of Biblical literature and oriental languages for students preparing for the ministry, to whom instruction in all the schools is free. A diploma is conferred for graduation in Biblical literature. In 1875 the college had 10 professors and tutors and 235 students.

RANGOON, a seaport and the capital of British Burmah, in Pegu, on the left bank of the E. branch of the Irrawaddy, known as the Rangoon, about 26 m. from the sea, in lat. $16^{\circ} 46' N.$, lon. $96^{\circ} 17' E.$; pop. in 1871, 96,952. The houses of the town are somewhat unequally distributed, in narrow but clean and well paved streets, over a space about a mile long, parallel to the river, and extending three quarters of a mile inland. There are several Buddhist pagodas, one Baptist, two Episcopal, and two Roman Catholic churches, and a number of schools. It is the centre of the American Baptist missions in Burmah, connected with which are a theological seminary, college, and printing office. The harbor is capable of receiving vessels of 1,200 tons, and the tide rises 18 to 25 and even 30 ft. Ship building is an important industry. The principal export is rice; next in the order of values come timber, raw cotton, and petroleum. The East Indian trade of Rangoon is mostly with Calcutta, but also extends to Madras ports and the Straits Settlements. There are five lighthouses on the Burmese coast to guide vessels to the port. The town is fortified and garrisoned. It has two markets, a recorder's court, and an English newspaper.—Rangoon was founded by the Burmese conqueror of Pegu in 1755. In 1852 it fell into the hands of the British, who have since retained it. In 1853 and 1855 it was greatly devastated by fire.

RANKE, Leopold von, a German historian, born at Wiehe, near Naumburg, Dec. 21, 1795. In 1818 he became principal teacher of the gymnasium of Frankfort-on-the-Oder. In 1824 appeared at Berlin his *Geschichte der romanischen und germanischen Völker von 1494–1555*. He was made professor of history in Berlin in 1825, and soon after was sent by the Prussian government to search for historical materials in the archives of Vienna, Venice, Rome, and Florence. The first results of his labors appeared in the 1st volume (embracing the history of the Ottomans and the Spanish monarchy) of his *Fürsten und Völker von Südeuropa im 16ten und 17ten Jahrhundert* (1827). In 1829 he published *Die serbische Revolution*, in 1831 *Ueber die Verschwörung zu Venedig im Jahre 1688*, and in 1837 *Vorlesungen zur Geschichte der italienischen Poesie*. His work *Die römischen Päpste, ihre Kirche und ihr Staat* ("The Popes of Rome, their Church and State," 3 vols., Berlin, 1834-'6), forming the 2d, 3d, and 4th volumes of the *Fürsten und Völker von Südeuropa*, &c., was translated into English by Mrs. Austin in 1840; by Scott, with an introductory essay by Merle d'Aubigné, in 1846; and by E. Foster in 1848.

A sixth edition of it was published in 1874 with the title *Die römischen Päpste in den letzten vier Jahrhunderten* (3 vols., Leipsic), and a seventh in 1875. In 1832 he began the *Historisch-politische Zeitschrift* (vol. i., Hamburg, 1832; vol. ii., Berlin, 1833-'6), which, being decried as illiberal, was discontinued in 1836. His *Deutsche Geschichte im Zeitalter der Reformation* ("History of Germany in the Time of the Reformation," 6 vols., Berlin, 1839-'47), in which he gave an account of the rise of Protestantism, was translated into English by Mrs. Austin (5th ed., 1874). It was followed by *Neun Bücher preussischer Geschichten* (3 vols., 1847-'8), for aid in writing which the Prussian archives were for the first time opened. This work has been translated by Sir A. and Lady Duff Gordon, under the title of "Memoirs of the House of Brandenburg, and History of Prussia during the 17th and 18th Centuries" (1849). He has also written *Jahrbücher des deutschen Reichs unter dem sächsischen Hause* (3 vols., 1837-'40); *Französische Geschichte, vornehmlich im 16ten und 17ten Jahrhundert* (5 vols., Stuttgart, 1852-'5), which contains an account of Protestant struggles in France; *Englische Geschichte im 16ten und 17ten Jahrhundert* (7 vols., Berlin and Leipsic, 1859-'68; English translation, "A History of England, principally in the Seventeenth Century," 6 vols., Oxford, 1875); *Geschichte Wallensteins* (Leipsic, 1869); *Ursprung des siebenjährigen Krieges* (1871); and *Genesis des preussischen Staats, und Aus dem Briefwechsel Friedrich Wilhelm's IV. mit Bunsen* (1873). An edition of his complete works, to comprise 36 vols., is in progress (29 vols., 1867-'74).—His brother **FRIEDRICH HEINRICH**, born in 1797, from 1842 chief councillor of the Protestant consistory of Munich, is the author of *Untersuchungen über den Pentateuch* (2 vols., Erlangen, 1834-'40), *Zeugnis von Christo* (2 vols., 1845-'8), *Das Leben in Christo* (Frankfort, 1852), &c.

RANKIN, a central county of Mississippi, bordered W. and N. W. by Pearl river and drained by its branches; area, about 800 sq. m.; pop. in 1870, 12,977, of whom 7,273 were colored. Its surface is covered with pine forests, and its soil is generally fertile. It is intersected by the Vicksburg and Meridian railroad. The chief productions in 1870 were 217,708 bushels of Indian corn, 5,996 of oats, 13,360 lbs. of rice, 3,279 of wool, and 8,705 bales of cotton. There were 1,327 horses, 1,083 mules and asses, 3,088 milch cows, 1,315 working oxen, 5,023 other cattle, 4,799 sheep, and 13,239 swine. Capital, Brandon.

RANKINE, William John Macquorn, a Scottish physicist, born in Edinburgh, July 5, 1820, died in Glasgow, Dec. 24, 1872. He attended scientific classes in the university of Edinburgh, and when 22 years of age published "An Experimental Inquiry into the Advantages attending the Use of Cylindrical Wheels." In 1843 he was elected an associate of the institution of civil engineers. In 1849 he pub-

lished an investigation of the theory of molecular vortices, and was elected a fellow of the royal society of Edinburgh, to which in 1850 he presented a paper on the mechanical action of heat, especially in gases and vapors, published in 1851. In the winter of 1850-'51 he took up his residence in Glasgow, and in 1852 read to the philosophical society a paper on transformation of energy. In 1855 he was chosen a fellow of the royal society of London, and delivered a course of lectures on the mechanical action of heat in the university of Glasgow, and was elected regius professor of civil engineering there. He published "Manual of Applied Mechanics" (1858); "Manual of the Steam Engine and other Prime Movers" (1859); "Civil Engineering" (1862); "Useful Rules and Tables" (1866); "Cyclopædia of Machine and Hand Tools" (1869); and "Manual of Machinery and Millwork" (1869).

RANSOM, an E. county of Dakota, recently formed and not included in the census of 1870; area, about 1,800 sq. m. The N. part is watered by the Sheyenne river, a tributary of the Red, and the S. W. corner by the Dakota. The surface consists of rolling prairies.

RANTOUL, Robert, jr., an American statesman, born in Beverly, Mass., May 13, 1805, died in Washington, D. C., Aug. 7, 1852. He graduated at Harvard college in 1826, was admitted to the Essex bar in 1827, and practised in South Reading till 1832, when he removed to Gloucester, which town he represented in the legislature in 1834-'7. He exerted himself for the abolition of capital punishment, and his report on that subject is still one of the standard authorities of the opponents of the practice. In 1837 he was appointed a member of the Massachusetts board of education. In 1838 he removed to Boston, in 1843 was appointed by President Tyler collector of the port, and in 1845 United States district attorney. In 1851 he filled a part of the unexpired term of Daniel Webster in the United States senate; and in the session of 1851-'2 he sat in the house of representatives, having been elected as a freesoiler. His speeches and writings, with a memoir, appeared in 1854.

RANUNCULUS (Lat., a little frog, some of the species growing in wet places where frogs abound), the botanical name of a large genus of plants, the common species of which are popularly known as buttercup, kingcup, or crowfoot. The genus gives its name to a large family, the *ranunculaceæ*, which comprises plants widely differing in their external appearance, many of which are among the best known and most showy wild and garden plants; the anemones, columbines, larkspurs, aconites, peonies, and others belong here. In modern systematic works upon botany this family is placed at the head of the list, and is the one with which the student first makes acquaintance, examples being found almost everywhere; the flowers are usually rather large and the structure distinct and easily made out. The

ranunculaceæ consist mainly of herbs (rarely undershrubs or woody climbers) with a colorless, acrid juice; they are polypetalous, or when the petals are absent the calyx is colored like, and is often mistaken for, the corolla; the stamens numerous, and the pistils (usually more than one) distinct (rarely somewhat united), one-celled, and one- to many-ovuled. The leaves when not radical are alternate, or in a few genera opposite, often much divided,



Ranunculus—Section of Flower.

and have sheathing petioles. In *ranunculus* itself there are five sepals and five flat petals, each with a little scale or pit at its base; numerous pistils, which ripen into a head of mostly flattened, one-seeded fruits or akenes; sometimes the sepals and petals are only three, or the petals more than five, and sometimes white instead of the usual yellow. There are about 160 species, which are distributed all over the world; in the eastern states there are some 20 species, including four introduced from Europe, and in the far west several others. Some are truly aquatic, others abound in muddy and swampy places; one is found only at the seaside or by the shores of the great lakes, and others are common weeds. All have an acrid juice, which in some is so powerful as to blister readily, and was formerly used as a vesicant; the leaves are said to be used by the professional beggars of London to keep up ulcers with which to excite sympathy. This acidity is dissipated in drying; one of the most active, very common in the meadows in the older states, is cut in large quantities with the grass, and is eaten with the hay, though animals at pasture avoid it in the fresh state. The species common as meadow weeds are the bulbous and the tall buttercups; the first named (*R. bulbosus*), more abundant in New England than elsewhere, is readily distinguished by the bulb-like base to the stem, and its very large flowers, more than an inch broad, and of a very deep shining yellow, blooming from May to July. Tall buttercup (*R. acris*) is more widely distributed and grows twice as high as the preceding, in rich soil being 3 ft. or more tall; its stem is not bulbous, and its smaller and paler flowers appear in June and continue till August and later. There are double varieties of both these species, common in gardens as double buttercups, the *boutons d'or* of the French. The creeping crowfoot or buttercup (*R. repens*) is a very common species, forming long runners which root at every joint; it is extremely variable, and often found without runners; it is a native, and somewhat troublesome in moist meadows and pastures. The yellow water buttercup (*R. multifidus* or *R. Purshii* of the older books) has its leaves very much dissected into filiform divisions, and bears

a large bright yellow flower; its handsome foliage makes it an excellent plant for an aquarium. The remaining natives are only of botanical interest.—Among the exotic species cultivated in gardens is *R. aconitifolius*, which grows 2 ft. or more high, and has large white



Garden Ranunculus (*Ranunculus Asiaticus*).

flowers; there is a double form of it, with flowers like minute camellias, which bears the fanciful name of "fair maids of France." Some other hardy species are grown in European gardens, but rarely in ours.—The Asiatic ranunculus (*R. Asiaticus*) ranks as a florist's flower. The roots, which are imported in autumn by the seedsmen with Holland bulbs, are in small clusters, fleshy, an inch or more long, and apparently without signs of life; they are not hardy generally in the northern

states, and if planted in the garden must be well covered; they are often cultivated in pots, in the same manner as bulbs, and give large very double flowers, 2 in. across, and of a great variety of colors.

RANZANI, Camillo, an Italian naturalist, born in Bologna, June 22, 1775, died there, April 23, 1841. He was educated at Bologna, and at the age of 22 became professor of philosophy in the university of Fano, where he received holy orders, and taught till 1798. Political disturbances compelling him to return to Bologna, he was appointed keeper of the botanic garden, and in 1803 professor of natural history in the university, of which he became rector in 1824. His chief work is his uncompleted *Elementi di zoologia* (10 vols., 1819 et seq.).

RANZ DES VACHES, the name applied to certain simple melodies played by the mountaineers of Switzerland upon the Alpine horn, which are identified with the scenes and pursuits of pastoral life. The term (in German *Kuhreigen* or *Kuhreihen*) means literally cow rows, and the musical call of the herdsman is so named from the fact that the cattle in answering it move toward him in a row, preceded by those wearing bells. The character of these melodies, which are scarcely such in fact, as they are not governed by the ordinary rules of music, varies in different parts of Switzerland. They are in general without words. A collection of the various *Ranz des Vaches* and other Swiss airs was published at Bern in 1818 under the title of *Sammlung von schweizer Kuhreihen und Volksliedern*. They are also incorporated in the *Allgemeines schweizer Liederbuch* (1851).

RAOUL-ROCHETTE. See **ROCHETTE**.

RAPE (law French, *rapt*; law Latin, *raptus*), the violation or carnal knowledge of a woman, forcibly and against her will. Early English statutes, which have perhaps in some of the United States the force of common law, extend this to the case of a woman child under the age of 10 years carnally known either with or against her will. Every civilized nation, ancient and modern, has declared by its criminal code its abhorrence of this offence, and affixed to its commission the severest punishments. By the Mosaic law, to ravish a damsel who was betrothed to another was a crime punishable with death; and in case of one not betrothed the offender was compelled to take the damsel to wife and pay her father a fine of 50 shekels. By the civil law rape was punishable with death and confiscation of goods. Unlike our law, however, the civilians made no distinction between rape as defined by us, of which force is the characteristic element, and seduction without force, of which the common law takes no cognizance; and by the civil law the unlawful carnal knowledge of a woman with her consent was subject to the same severity of punishment as if obtained forcibly and against her will. This, we are told, was because the Roman law entertained so high an opinion of the virtue and chastity of woman, that it would not presume her to be capable of a violation of those qualities, unless induced thereto by the evil arts and solicitations of man; and in order to secure her the more effectually from the danger of these, it made such a violation of chastity, however consummated, equally a crime in him, and visited its penalties upon him alone. By the Saxons rape was also esteemed a felony and punished with death, though the woman ravished (if single) might redeem the offender from execution if she were willing to accept him as her husband, and he were willing to be so redeemed. But William the Conqueror, probably deeming the punishment of death too severe, altered it to castration and loss of the eyes. In the reign of Edward I. the law was still further modified, and rape was declared to be, and was punished as, a misdemeanor only; but the consequences of this amelioration proving disastrous and inducing a fearful increase of the crime, 10 years afterward, during the same reign, it was restored to the rank of felony and punished as before with death. By 9 George IV. it was made a non-capital felony, and is now punishable by imprisonment with hard labor for not less than two years. In the United States, although by statute the punishment varies somewhat in different states, it is by all treated as felony and punished with imprisonment for life or for a term of years.—It was for a long time an unsettled question what was requisite to constitute this offence, and proof of the full accomplishment of the act was once considered indispensable in order to secure a conviction. As far as the wrong and outrage to the individual is concerned,

the crime is perhaps equally entire where the offence is imperfectly committed. But the physical completion of the offence is not now necessary, in law, to complete the guilt of the offender; for it is not the degree of gratification to the lust of the ravisher which gauges the degree of criminality, but the injury done to the person and feelings of the victim, and the dastardly violation of that modesty and sense of delicacy which nature has implanted in the female heart. Force is a necessary element, and the offence must be perpetrated against the will of the party ravished. Though the woman at first consent, yet if she is afterward forced, or if her consent is obtained through duress or fear of death, it is equally a rape; and so careful is our law of the rights and safety of all classes and persons, that even a common prostitute may be the subject of a rape, though by the civil law she could not be. But fraud is not equivalent to force, and in the case of Jackson, who accomplished his purpose by personating the woman's husband during his absence, it was held, after careful consideration by the judges, that he could not be convicted of rape, but simply of an assault. It has been made a question whether sexual intercourse with a female *non compos mentis* should not be held to be rape, on the ground of her inability to give consent; but the authorities are to the contrary where no force is employed and such consent as she is capable of is given. A husband cannot commit a rape upon his wife, for by the marriage contract she yields herself to him, and she cannot afterward retract her assent; but if he is present, and aids in prostituting her to another against her will, he becomes thereby equally guilty with the principal, and is liable to the same punishment as the actual perpetrator of the outrage. An infant under 14 years of age is presumed in law, on the ground of a supposed imbecility of body if not of mind, to be incapable of committing a rape; and though as to other felonies the maxim *malitia supplet aetatem* holds, it is not so as regards this offence. An infant may, however, where the mischievous intention and capacity are evident, become a principal in the second degree, or suffer conviction for an assault with intent.—The party ravished is a competent witness against the accused; but her credibility is a matter for the consideration of the jury. If unsupported by other direct testimony, it must depend on concurrent circumstances for confirmation; as “for instance,” says Sir Matthew Hale, “if the witness be of good fame, if she presently discovered the offence, made pursuit after the offender, showed circumstances and signs of the injury, whereof many are of that nature that only women are the most proper examiners and inspectors, if the place where the fact was done was remote from people, inhabitants, or passengers, if the offender fled for it; these and the like are concurring evidences to give greater probability to her testimony, when

proved by others as well as herself.” In charges of this nature the courts are compelled to proceed with the utmost caution and care and to require convincing evidence of guilt before convicting the accused; for, as Sir Matthew Hale further remarks: “It is true rape is a most detestable crime, and therefore ought severely and impartially to be punished with death; but it must be remembered that it is an accusation easily made and hard to be proved, and harder to be defended by the party accused, though never so innocent;” and he then proceeds to state several singular cases which came under his own judicial observation, and in which innocent men falsely and maliciously accused of this crime narrowly escaped conviction. The defendant may impeach the character of the prosecutrix by general evidence, but particular acts of misconduct or immorality are inadmissible. As regards the testimony of children under 10 years of age, upon whom this offence has been committed, it is admissible where the witness is old enough and has sufficient instruction and intelligence to understand the relations of good and evil, and the nature of an oath; but, like that of older complainants, its credibility depends upon similar supporting circumstances.—As in other felonies, there may be accessories before and after the fact; but all persons actually present, aiding and abetting its commission, are principals, and are liable to the same punishment as that awarded to the actual perpetrator of the outrage. An attempt to commit a rape, which is usually indicted as “an assault with an attempt,” &c., is a high misdemeanor, and is severely punished by the laws of the various United States.

RAPE (Lat. *rapum*), a cruciferous plant cultivated from very early times for the oil contained in its seeds, and as a forage plant. It belongs in the genus *brassica*, sufficiently described under **MUSTARD**; some botanists place the turnip and rape as distinct species (*B. napus* and *B. rapa*), but the best authors now regard both as varieties of *B. campestris*, a variable plant found throughout Europe and Russian Asia, and differing from others of the genus in having its stem leaves sessile and auricled, or produced at base into two rounded lobes; the lower leaves pinnately divided, slightly glaucous, and usually rough with stiff hairs; flowers bright yellow. Though not botanically distinct from the turnip, the two are quite unlike in their uses; the turnip having been cultivated for centuries with a view to the development of the root to the neglect of all other parts, while in the rape, the greatest amount of seeds being desirable, no regard has been had to the root, which remains small and in its natural condition. The plant is an annual, but some of the forms of it are treated like biennials, being sown in autumn to perfect itself the following summer. It is an important plant in English agriculture, where it is cultivated for its herbage, of which on rich

land it yields an enormous amount, the plant standing 4 ft. high; domestic animals generally are fond of it, and it is especially useful for sheep, which are allowed to feed it off, and thus enrich the land; it is sometimes ploughed under as a green fertilizer. In this country



Rape (*Brassica campestris*, var. *rapa*).

rape has been but little cultivated; the winters in the northern states are too severe for the fall-planted kinds, but the early or German rape, sown in May, has been satisfactorily tried by some sheep raisers. In Europe it is grown in gardens as a salad plant and pot herb, being eaten young in the same manner as mustard. As a forage plant it is sown broadcast, the stems being more succulent if the plants are crowded; but when grown for its seeds, the young plants are raised in a seed bed, and when large enough are set in the field in rows the same as cabbages; the yield of seed varies from 20 to 40 bushels to the acre. The seeds closely resemble those of the turnip, but are somewhat larger; they yield about 33 per cent. of oil, which, when freed from the mucilage it contains, is used as a lubricator, for illumination, for dressing leather, in the manufacture of woollen cloths, for soap making, and for other purposes; it is also called colza oil, a name more especially given to that derived from a sub-variety called *B. campestris oleifera*. The mass left after the expression of the oil, known as rape cake, is a considerable article of commerce in Europe; its composition is, in 100 parts, water 15, ash 7.4, albuminoids 18.3, carbohydrates 33.5, crude fibre 15.8, fat, &c., 10; it is a powerful manure, which acts promptly, and is used either in compost, or ground fine and drilled in with the seed; it is especially valuable for turnips and wheat.

RAPHAEL (RAFFAELLE SANZIO, or SANTI D'URBINO), an Italian painter, born in Urbino, April 6, 1483, died in Rome, April 6, 1520. He belonged to a family of artists, and his father, Giovanni Santi (whose life has been written

by Count Pompeo Gherardi, 1875), was his first instructor. At the age of 12 he was placed in the school of Perugino, and remained with him until near his 20th year, assisting him, but attempting nothing which can be authenticated as his own until about 1500. After leaving the school of Perugino, he worked for about a year in Perugia, producing the "Marriage of the Virgin," now in the Brera at Milan, and well known by Longhi's engraving; "The Knight's Dream," now in the British national gallery; the "Agony in the Garden," and "St. Michael and St. George," all executed in what is known as his first or Peruginian manner. In 1504 Raphael visited Florence for the first time. The compositions by Leonardo da Vinci and Michel Angelo, known as the "Battle for the Standard" and the "Cartoon of Pisa," had recently been opened to public inspection, and to their influence may be attributed the new era which thenceforth commences in his development. He returned in the same year to Perugia, and for several months was employed in painting altarpieces, after which he revisited Florence, where he remained until the middle of 1508. During this period he painted about 30 pictures, the latest essentially after the style of the Florentines, and particularly of Leonardo da Vinci. Preëminent among them were those testifying his devotion for the Virgin, to whom in after life he dedicated a chapel in Rome. "The mere collection of all the Virgins painted or even designed by Raphael," says Quatremère de Quincy, "and the detail of the variations which he introduced into his compositions, would form an abridged history of his genius." The *Madonna del granduca*, now in the Pitti palace, painted either during his first visit to Florence or in the early part of his longer sojourn there, represents the highest perfection of which Perugino's type was capable. Immediately succeeding this in date were the "Madonna of the Palm Tree," now in the Ellesmere collection; the *Madonna del cardellino* (of the goldfinch), in the Florentine gallery, so called because the little St. John is presenting a goldfinch to the infant Christ; and the picture in the Louvre known as *La belle jardinière*, in which the Madonna is sitting with the two children in the midst of a beautiful landscape. To this Florentine period belong also the "St. Catharine" in the British national gallery, the two little "St. Georges" in St. Petersburg and the Louvre, the "Entombment" in the Borghese gallery, and the well known portrait of himself in the Uffizi at Florence. The production of works like these made Raphael's name famous over all Italy, and Pope Julius II. invited him to complete the frescoes of those halls of the Vatican which had been left unfinished by Nicholas V. and Pius II. In the middle of the year 1508 Raphael arrived at the papal court, and began that grand series of works which develop his third or Roman manner. His frescoes, cover-

ing the ceilings and walls of three chambers or *camere* and a large saloon, known collectively as the "Stanze of Raphael," were intended to glorify the power of the church, and to represent Rome as the centre of spiritual culture. The first saloon, called the *camera della segnatura*, he dedicated to representations of theology, poetry, philosophy, and jurisprudence, each of which is personified by an allegorical figure on the ceiling, while beneath, on the four sides of the apartment, are painted the principal subjects. "Theology," sometimes called the "Dispute of the Sacrament," consists of an assemblage of doctors and dignitaries of the church seated in council, above whom is represented, in the symmetrical and conventional manner of the early painters, a heavenly glory, with Christ throned on clouds and presiding over a host of patriarchs, saints, and angels. This, the first work executed by Raphael in Rome, is also the last of his large compositions which contains traces of his early religious, Peruginesque manner. The influence of the antique, which he here first felt in its fulness, the proximity of Michel Angelo, who was then painting his sublime frescoes in the Sistine chapel, and the importance and grandeur of the subjects upon which he was engaged, gave a new impulse to his genius, and he reached almost at a single step the limit of his style. His next work in point of date, "Poetry" or "Parnassus," representing an assembly of Greek, Roman, and Italian poets on Mount Parnassus, with Apollo and the Muses in the centre, marks perhaps the transition period; but in "Philosophy" or the "School of Athens," which followed, the Roman style is matured. The composition represents a grand hall or portico, in which are characteristically grouped the great philosophers and sages of antiquity. The remaining fresco in this *stanza*, "Jurisprudence," owing to the peculiar construction of the wall, is divided into three compositions, Gregory delivering the ecclesiastical law, and Justinian promulgating his code of civil law, above which are female personifications of prudence, fortitude, and temperance. These frescoes were finished in 1511, and appear to have been immediately succeeded by those in the *stanza* of Heliodorus, so called from the story of the expulsion of Heliodorus from the temple, as related in the second book of Maccabees, which is painted on one of its walls. In this composition the group of Heliodorus and the pursuing angels is especially noticeable for its supernatural power. The "Mass at Bolsena," "Attila terrified by a Celestial Vision," and "St. Peter delivered from Prison" occupy the remaining walls of this *stanza*; and on the ceiling are representations of the promises of God to the four patriarchs, Abraham, Isaac, Jacob, and Moses. Julius II. died during the progress of the work, but his successor, Leo X., directed its completion, as also that of the other works in the Vatican on which Raphael was engaged, besides intrusting him with new ones.

Before this time, however, commissions multiplied so greatly upon the painter's hands, that he was obliged to commit to the best of the numerous scholars who now resorted to him from all parts of Italy the execution of portions of the frescoes in the remaining *stanze* from his cartoons and designs. In this manner was painted the *stanza dell'incendio*, which takes its name from the principal subject illustrated, the "Fire in the Borgo," and in which are represented the prominent events in the lives of Popes Leo III. and IV. The frescoes in the *sala di Constantino*, the last of the series, were executed after his death under the direction of Giulio Romano, his most eminent pupil. They all suffered from neglect after the removal of the popes to the Quirinal palace, and were cleaned and in some instances restored by Carlo Maratti in the 18th century. While engaged on these works Raphael executed in fresco for Agostino Chigi, a banker of Rome, the four grand figures of the Sibyls in the Chigi chapel of Santa Maria della Pace, and the well known "Triumph of Galatea," besides many Madonnas and other easel pictures. His fortune kept pace with his celebrity, and he lived in princely magnificence, admired and beloved by all contemporary artists, excepting Michel Angelo, who ill endured the fame of his young rival. During the progress of the later works in the *stanze* Leo X. employed Raphael on the decoration of the *loggie*, or open galleries round three sides of the court of St. Damasus (the older portion of the Vatican), and the designs for the tapestries of the Sistine chapel. For the *loggie* he furnished a series of designs from the Old Testament, known as "Raphael's Bible," which were executed in 13 small cupolas on the gallery on the second story by Giulio Romano, Francesco Penni, Pellegrino da Modena, Perino del Vaga, and others of his pupils. A variety of beautiful arabesque ornaments and stuccoes in the same gallery were executed from his designs by Giovanni da Udine. The cartoons for tapestries, prepared probably between 1513 and 1516, represent the highest efforts of Raphael's genius in historical composition. They are from 14 to 18 ft. long by 12 high, and are colored in distemper. The subjects are "The Death of Ananias," "Elymas the Sorcerer struck with Blindness," "The Healing of the Lame Man at the Beautiful Gate of the Temple," "The Miraculous Draught of Fishes," "Paul and Barnabas at Lystra," "Paul preaching at Athens," and "The Charge to Peter." These cartoons, at the suggestion of Rubens, were purchased by Charles I. of England, and are now deposited in the South Kensington museum. The remaining cartoons of the series, representing "The Stoning of Stephen," "The Conversion of St. Paul," and "Paul in the Prison of Philippi," are lost. The original tapestries, for which the pope paid the manufacturers in Arras 50,000 gold ducats, after various mutations of fortune, are now in the

Vatican, but are so injured and faded that the general effect of the coloring is destroyed. Raphael also furnished the designs, but not the cartoons, for a second series of ten tapestries which are now in the Vatican. Amid these great undertakings he did not neglect the subjects which had first inspired his pencil, and the numerous Madonnas and holy families produced during his residence in Rome include some of the most characteristic and admirable of his works. Distinguished among them is the wonderful *Madonna di San Sisto* (painted between 1517 and 1520) in the Dresden gallery, representing the Virgin standing in a majestic attitude with the child in her arms. It is said to have been painted at once on the canvas, without any preliminary study, and has been engraved in a style not unworthy of the original by Friedrich Müller. Other celebrated Madonnas of this period are the *Aldobrandini Madonna*, in the possession of Lord Garvagh, that known as the *Bridgewater*, the *Vierge au diadème* in the Louvre, the lovely *Madonna della sedia* or *seggia* in the Pitti palace, the *Madonna di Foligno* in the Vatican, that called the "Pearl" at Madrid, and the *Madonna del pesce* in the Escorial, the two last mentioned being altarpieces with saints assembled around the Virgin. Of several of these duplicates exist, and all of them have been repeatedly engraved. Among his remaining easel pictures are the *St. Cecilia*, now in Bologna; the "Archangel Michael overcoming the Devil," in the Louvre; "Christ bearing the Cross," known as *Lo spasimo di Sicilia*, in Madrid; and his last, and by many considered his grandest work, the "Transfiguration," in the Vatican, painted in competition with Sebastian del Piombo's "Raising of Lazarus," of which Michel Angelo is said to have furnished the design. He executed upward of 80 portraits, the most famous being those of Julius II. and Leo X., the originals of both of which are in Florence, Cardinals Bibbiena, Bembo, de' Medici, and de' Rossi, Joanna of Aragon, and the "Fornarina," which was long supposed to represent one of his mistresses, but which Passavant considers to be the portrait of a celebrated improvisatrice named Beatrice Pio. The last named picture is in the Barberini palace in Rome. To this list of works must be added the fresco of "Cupid and Psyche" in the villa Farnesina, and numerous drawings in chalk, from which the engraver, Marc' Antonio Raimondi, executed several of his finest plates. Raphael also directed the construction of St. Peter's from his own plans subsequent to the death of Bramante in 1514, besides executing several other architectural works; and he made at least one statue in marble, besides designing others. He died of a fever caught in superintending some subterranean excavations, and was buried in the Pantheon, near the remains of Maria di Bibbiena, niece of the cardinal of that name, to whom he had been betrothed. Through some doubt as to the place of his

sepulture, his remains were exhumed in September, 1833, and on Oct. 18 reinterred with great ceremony. Of his private character Mrs. Jameson says: "There was a vulgar idea at one time prevalent that Raphael was a man of vicious and depraved habits, and even died a victim to his excesses; this slander has been silenced for ever by indisputable evidence to the contrary, and we may now reflect with pleasure that nothing rests on surer evidence than the admirable qualities of Raphael; that no earthly renown was ever so unsullied by reproach, so justified by merit, so confirmed by concurrent opinion, so established by time."—His life has been written by Quatremère de Quincy (Paris, 1824); by Passavant (3 vols., Leipsic, 1839-'58); by Baron von Wollzogen (1865; English translation by F. E. Bunnett, London, 1866); and more briefly by Mrs. Jameson in her "Memoirs of the early Italian Painters." See also Kugler's "Handbook of Italian Schools." The house in Urbino where Raphael was born was purchased in 1873, restored, and used as a museum.

RAPHALL, Morris Jacob. See supplement.

RAPIDAN, a river of Virginia, rising in the Blue Ridge mountains. It flows first S. and then E., forming the boundary between Greene and Orange counties on the right and Madison and Culpeper counties on the left, and empties into the Rappahannock about 10 m. above Fredericksburg. Its length is about 80 m.

RAPIDES, a W. parish of Louisiana, bounded N. E. by Little river, and intersected by the Red and Calcasieu rivers; area, about 2,000 sq. m.; pop. in 1870, 18,015, of whom 10,267 were colored, since which a portion has been taken to form Vernon parish. The surface is nearly level and the soil generally fertile. The chief productions in 1870 were 261,579 bushels of Indian corn, 54,276 of sweet potatoes, 9,133 bales of cotton, 8,868 lbs. of wool, 3,324 hhds. of sugar, and 212,860 galls. of molasses. There were 2,225 horses, 1,976 mules and asses, 3,748 milch cows, 1,218 working oxen, 9,259 other cattle, 3,848 sheep, and 14,724 swine; 18 establishments for the manufacture of sugar, and 1 saw mill. Capital, Alexandria.

RAPIN, Paul de, sieur de Thoyras, a French historian, born in Castres, March 25, 1661, died in Wesel, May 16, 1725. He became an advocate, but turned his attention to arms and literature. Being a Protestant, he went to England on the revocation of the edict of Nantes (1685), and afterward to Holland, where he joined a company of French cadets, and followed the prince of Orange (William III.) to England. He was at the battle of the Boyne, and was wounded in the siege of Limerick. He afterward became tutor of the young duke of Portland, and in 1707 settled in Wesel on the Rhine. His most important work is his *Histoire d'Angleterre* (9 vols. 4to, the Hague, 1724), in which the narration of events is carried down to the death of Charles I. It was translated and continued by N. Tindal, and has

been often printed (2 vols. fol., 1732-'3; 5 vols. fol., 1743-'7; 21 vols. 8vo, 1757-'9).

RAPOPORT. See **RAPPAPORT**.

RAPP, Georg, founder of the sect of Harmonists, born in Württemberg in 1770, died at Economy, Pa., Aug. 7, 1847. Believing that he had a divine call, and was charged with the restoration of the Christian religion to its original purity, he organized a community on the model of the primitive church, with goods in common. A difficulty with the government in regard to worship impelled Rapp to transplant his community in 1803 from Württemberg to the United States. They settled first on Connequenessing creek, in Butler co., Pa., where they founded the village of Harmony, and employed themselves in agriculture and manufactures. They acquired considerable wealth, and in 1815 removed to the territory of Indiana, where they had purchased a tract of 27,000 acres on the Wabash. The settlement of New Harmony here was even more prosperous than their former establishment, but in 1824 they sold the property to Robert Owen, and emigrated to Beaver co., Pa., where the town of Economy was laid out on the right bank of the Ohio, 17 m. N. W. of Pittsburgh. It is an agricultural and manufacturing community. Members of both sexes are admitted, but they do not marry; they profess Protestantism, observe strict morality, and pay much attention to education. There was a secession of about 200 members in 1832. The village of Harmony (pop. in 1870, 225) was in 1851 set off from the township of Economy (pop. in 1870, 1,324).

RAPP, Jean, a French general, born in Colmar in April, 1772, died in Paris, Nov. 8, 1821. He entered the French army as a private in 1788, distinguished himself during the wars of the revolution, and was an aide-de-camp of Desaix in Italy and Egypt. After the battle of Marengo Napoleon attached him to his staff, and when he became emperor Rapp was promoted to brigadier general. At Austerlitz he decided the victory by precipitating his force upon the Russian imperial guard, and was made general of division. He distinguished himself in the succeeding campaigns, especially at Golymin (1806), where he was wounded for the ninth time. To enable him to recruit his health he was intrusted with the government of Thorn, and subsequently with that of Dantzic. He was in the campaign of 1812 against Russia, receiving at the Moskva his 23d wound; and after the disastrous result of that invasion he withdrew to Dantzic, where he was blockaded by the Prussians and Russians. He held out 12 months, but finally surrendered, and was carried to Russia as prisoner of war. Returning to France on the restoration, he was sent to oppose the return of Napoleon, but went over to his old leader, who appointed him commander-in-chief of the army of the Rhine. But being pressed by an Austrian army superior to his, he retired to Strasburg, and after the second restoration

went to Switzerland. In 1818 he returned to France, was reinstated in the army, and in 1819 was made a peer. He left a volume of "Memoirs," published in 1823.

RAPPAHANNOCK, a river in the E. part of Virginia, formed by the confluence of the North fork and other small streams, which rise in the Blue Ridge and unite on the N. E. border of Culpeper co. At the S. E. extremity of that county it receives the waters of the Rapidan, its largest tributary; thence flowing in a devious course, it reaches tide water at Fredericksburg, where by a fall it supplies valuable power; thence it becomes navigable, and enters Chesapeake bay by an estuary about 60 m. long. The whole length in a straight line from its sources to Chesapeake bay is about 140 m., but with its numerous and intricate windings its real length must be nearly twice as much. Its general course is S. E.

RAPPAHANNOCK, a N. E. county of Virginia, bordered N. E. by the North fork of the Rappahannock, and drained by others of its head waters; area, about 250 sq. m.; pop. in 1870, 8,261, of whom 3,066 were colored. It is bordered N. W. by the Blue Ridge, and has a generally fertile soil. The chief productions in 1870 were 103,112 bushels of wheat, 10,755 of rye, 304,040 of Indian corn, 44,297 of oats, 2,058 tons of hay, 23,918 lbs. of tobacco, 15,036 of wool, 87,426 of butter, and 3,319 gallons of sorghum molasses. There were 2,087 horses, 1,904 milch cows, 5,192 other cattle, 3,655 sheep, and 5,615 swine. Capital, Washington.

RAPPAPORT, or **Rapoport**, Solomon Judah, a Jewish antiquary, born in Lemberg in June, 1790, died in Prague, Oct. 16, 1867. He published critico-biographical and other essays in the Hebrew periodicals *Bikkurei ha'ittim* (Vienna, 1820-'31) and *Kerem 'hemed* (Vienna and Prague, 1833-'45), which raised him to the highest rank among the Hebrew scholars of the age. The most important of his numerous writings, including the posthumous *Na'halath Yehudah* (Cracow, 1869), is the first volume of a Talmudo-rabbinical encyclopædia entitled *Erekh millin* (Prague, 1852). He was elected rabbi of Tarnopol in 1837, and of Prague in 1840, and held the latter position till his death.

RARATONGA, or **Rarotonga**. See **Cook's ISLANDS**.

RARITAN, a river of New Jersey, formed by the confluence in Somerset co. of two branches, both having their sources in the mountains of Morris co.; the North branch flows mainly due S., and the South branch makes a curve S. W. through Hunterdon co., and then forms a circuit to the north. From the junction the course of the Raritan is nearly E. It passes by New Brunswick, whence it is navigable to Raritan bay, which it enters at Perth Amboy. The main stream is about 33 m. long.

RASCIA, in the middle ages, the name of southern Servia, derived from Rasa (now Novi-Bazar), on the Rashka, and subsequently ex-

tended to the whole of the Servian kingdom. The name Rascians, variously modified, is still used in Hungary, Roumania, and other countries, to designate various Serb populations living outside of Servia.

RASHI. See SOLOMON BEN ISAAC.

RASK, Rasmus Christian, a Danish philologist, born at Brendekilde, on the island of Fünen, Nov. 22, 1787, died in Copenhagen, Nov. 14, 1832. He graduated at the university of Copenhagen, was appointed an assistant in the university library in 1808, and in 1811 published in Danish his "Introduction to the Study of the Icelandic or Old Norse Language." In 1812 he went to Sweden, and in 1813 to Iceland, where he remained three years studying its history and literature. In 1817 he was in Stockholm, and in 1818 and 1819 in Finland and St. Petersburg, occupied with the study of Finnish, Russian, Armenian, Persian, and Arabic. From St. Petersburg he went to Persia, thence to India and Ceylon, and returned to Copenhagen in 1823. He was appointed professor of literary history in the university in 1825, of oriental languages in 1828, and first librarian in 1829. According to Bunsen, Rask anticipated some of the greatest discoveries of Grimm, Bopp, and Burnouf. He published Icelandic, Anglo-Saxon, Spanish, Frisian, Danish, and Lappish grammars, and works on the ancient Egyptian chronology, on the oldest Hebrew chronology, and on the Thracian and Zend languages. After his death his contributions to various journals were collected, with a life by Petersen (3 vols., Copenhagen, 1834-'8).

RASKOLNIKS, or **Roskolniks**, the principal class of Russian dissidents. See RUSSIA.

RASPAIL, François Vincent, a French naturalist and revolutionist, born in Carpentras, Jan. 29, 1794, died June 8, 1878. He studied at Avignon, settled in Paris in 1815 as a scientific writer, and was wounded in the revolution of 1830. He was subsequently a journalist, spending many years in prison on account of his revolutionary writings. He led the populace in 1848 to proclaim the republic, and was afterward again imprisoned till 1854, although elected in 1849 to the national assembly. In the interval he had also been imprisoned for illegal practice of medicine. He had sold camphor in the form of cigarettes as the best remedy against internal and external parasites, and written much on the subject. In 1869 he was elected to the legislative body, and joined Rochefort in editing the *Marseillaise*. In 1870-'71 he was identified with the commune movement. His principal works are: *Nouveau système de chimie organique* (new ed., 3 vols., 1838); *Nouveau système de physiologie végétale*, &c. (2 vols., 1837); *Histoire naturelle des ammonites et des térébratules* (3 vols., 1842; new ed., 1866); *Histoire naturelle de la santé et de la maladie* (3 vols., 1839-'43; 3d ed., enlarged, 1857); *Manuel de la santé* (annual, 1846-'65); and *Nouvelles études scientifiques et philologiques* (1865).

RASPBERRY, the name (of very doubtful derivation) of fruit-bearing shrubs of the genus *rubus*, of the order *rosaceæ* or rose family. The genus consists of shrubs or half-shrubby (and a few herbaceous) perennial plants, with mostly compound leaves; the lobes of the bractless calyx persistent; petals five; stamens and pistils numerous; the ovaries containing two ovules, and in fruit becoming one-seeded pulpy drupes, which cohere in a head or cluster above the open calyx. It is one of those genera in which the species are so variable that their number has been unduly increased by local botanists; over 500 have been described, but there are probably not more than 100 good species. The genus *rubus* includes both the raspberries and the blackberries; in the former the drupes cohere, and when ripe fall away from the dry receptacle, or in some species there are only a few grains which fall separately, while in the latter the drupes remain attached to the receptacle. Our native raspberries are divided into three sections: 1. With simple leaves, large flowers, plant without prickles, and the fruit very flat and broad. To this section belongs what is called in this country the rose-flowering, and in England the Virginia raspberry, *R. odoratus*; it is about 5 ft. high, with ample three- to five-lobed leaves, which as well as the young shoots are viscid with glandular bristly hairs; the flowers, of a rich rose-purple color, are about 2 in. across; the fruit, which is variable, is sometimes an inch broad, very flat, reddish, with a rather pleasant flavor, though dry. This is found in rocky places from Canada to the mountains of Georgia, and is sometimes seen in cultivation, though not so often as it deserves; its large flowers, varying in depth of color, appear much like single roses, and it blooms at midsummer, when but few shrubs are in flower. The white-flowering raspberry, *R. Nutkanus*, was first discovered at Nootka on the N. W. coast, but has later been found to extend as far east as upper Michigan; among other differences from the foregoing, it is not bristly and has white flowers. The Rocky mountain bramble, *R. deliciosus*, is hairy, and has smaller leaves and larger flowers than either of the preceding; it has recently been introduced into gardens, and will be popular on account of its abundant flowers, which are pure white, and have a peculiarly delicate texture; the specific name was given it by Torrey, from the accounts of the fruit given by the discoverer Dr. James; but it proves to be very indifferent. Belonging to the same section is the cloudberry, *R. chamæmorus*, a low, creeping, nearly herbaceous, dioecious, subalpine species, with white flowers, and a few amber-colored, very large grains; it is also a European species, and is found throughout arctic America, on the White mountains above the tree line, and at Mount Desert and other points on the eastern coast, where its fruit is called the baked-apple berry. 2. The second section comprises low, mostly

herbaceous, and unimportant species. 3. Species with biennial, woody, and prickly stems, and three to five foliolate compound leaves. The common wild red raspberry is found from Newfoundland to Oregon, and as far south as the middle states. The upright stems are bristly and prickly; the leaves, with three to five oblong-ovate, serrate leaflets, are covered on the under side with a white down; the petals as long as the sepals, the fruit light red. This species is abundant northward, especially on recently cleared lands, where it produces fruit in great profusion all summer. The garden raspberry of Europe, *R. Idæus*, is so very near this that it is difficult to find good botanical characters to separate them; this species has been improved by raising seedlings under cultivation; varieties derived from it are the Allen, Kirtland, scarlet, and others. The plant propagates itself abundantly by underground stems, which run beneath the surface for several feet and appear above ground as suckers; these stems grow to their full height, 5 or 6 ft., in one season, bear their fruit the next summer, and then die; the European raspberry has a similar manner of growth, and the cultivation of the varieties of this species is the same as given below for that.—The black raspberry, *R. occidentalis*, also called blackcaps and thimbleberry, is more widely distributed than the red, extending as far south as Georgia; it has prickly stems with a glaucous bloom; leaflets mostly three and white underneath; the petals shorter than the sepals; the fruit black, with whitish varieties, ripe in July, drier than the red, and with a distinct and peculiar flavor. In manner of growth this is very different from the red raspberry; it makes no distant suckers, but new shoots spring up from the base of the old plant, and late in summer the branches, which grow very long, become recurved, until finally their tips reach the ground, where they take root and form new plants; in cultivation this process is aided by covering the ends of the branches with a little earth. Within the past 20 years much attention has been given to cultivating varieties of this species, and they are now very popular. Among the cultivated sorts are Doolittle's, Seneca, Davidson's thornless, Miami or Mammoth cluster, and the whitecap. In cultivating for fruit, the stems are stopped by pinching when about 3 ft high, and the side branches are also stopped, forming a compact branched bush, which will bear a great quantity of fruit; but if it is desired to multiply plants, the branches are allowed to grow, bend over, and reach the ground as described above.—There is a set of native raspberries which appear to have escaped the attention of botanists, but are well known to cultivators as the purple-cane family; the plants have the habit of growth of the black, but the fruit, though dark-colored, resembles in form and flavor the red raspberry; it has been suggested that these have originated by hybridizing the black and

red species. They are not so high-flavored as the red kinds, but as they bear profusely and do not sucker, they are better adapted to small gardens; the varieties are purple cane, Catawissa, Ellisdale, and a few others.—The garden raspberry, *R. Idæus*, so named from Mount Ida, is found all over Europe and in Russian Asia; it only differs from our native red species in being a taller plant, with thicker leaves and firmer, larger, and better fruit. This species was cultivated by the Romans in the 4th century, and the oldest English writers on rural matters mention it, some giving both a red and a white kind. There are over 50 varieties in the fruit lists, very few of which are generally cultivated; among the most popular kinds are those which have been raised in this country from seed. The berry with which the New York market is mainly supplied is the Hudson River Antwerp, a red variety of unknown (though supposed English) origin; immense quantities are brought from various lo-



European Raspberry (*Rubus Idæus*).

calities along the Hudson, and it has not yet been superseded by any other; among the other popular varieties of this class are Belle de Fontenay (with many synonymes), Clarke, Downing, Fastolf, Franconia, Hornet, Brinckle's orange, and Philadelphia. The last named is by some regarded as a native; it is a great bearer even on poor soils, and, though not of first quality, is one of the most profitable. These varieties are propagated by suckers, which most of them produce in abundance; after the sucker has grown a year it is separated from the parent plant, and, its stem being cut back to a few inches, is taken up for planting. A plantation is made in autumn or very early in the spring, setting the plants, according to the vigor of the variety, 4 to 6 ft. apart each way; two or three shoots are allowed to grow from the plant the first season, and not more than six thereafter; they are supported by tying to stakes, or to wires stretched along the rows; the shoots bear fruit the second

year, and at the same time new shoots are produced, which will fruit the following year; as soon as the fruit is gathered the old canes are cut out, and all surplus shoots are removed. All the foreign varieties in the northern states (and they do not succeed in the southern) need to be covered in winter.

RASSAM, Hormuzd. See supplement.

RASSE. See CIVET.

RASTADT, a fortified town of Baden, on the Murg, 14 m. S. W. of Carlsruhe; pop. in 1871, 11,559. It has a fine palace, a Protestant and several Catholic churches, a Catholic normal school, a lyceum, and a museum. A congress met here in November, 1713, and a treaty of peace was signed March 6, 1714, ending the Spanish war of succession. The treaty of peace of Campo Formio and the secret Rastadt convention of Dec. 1, 1797, gave to France all German fortresses on the Rhine. At the second congress of Rastadt for peace between France and Germany, which opened Dec. 9, 1797, the extravagant demands of the French were granted; but war being renewed, the congress broke up in April, 1799, and the French ambassadors, on leaving, were murdered near the town by Austrian hussars (April 28). By the treaty of Vienna of 1815 Rastadt became a fortress of the Germanic confederation. The Baden revolution of 1849 began here May 11, with a mutiny of the Badenese troops, which was followed by a rising in Carlsruhe. A few days later the Austrian garrison abandoned the fortress, which was occupied in June by the insurgent troops under Mieroslawski, a provisional government having replaced that of the grand duke. The rising extended to the Rhenish Palatinate, but was suppressed by Prussian intervention under the command of the crown prince (the present emperor William). Rastadt was blockaded at the end of June, and bombarded on July 6 and 7, and surrendered on July 23. It was occupied by the Prussians from that time till 1866.

RAT, a well known rodent, the type of the subfamily *murinae*. In the murine tribe of this

body 8 to 10 in. long, and the tail 6 to 8 in., scantily covered with hair and with about 200 rings; the color above is grayish brown mixed with rusty, grayer on the sides, and ashy white below; the upper surface of the feet dirty white. This species, originally from India and Persia, entered Europe through Russia, appearing in the central countries about the middle of the 18th century; it was brought to America about 1775, and has since greatly increased in numbers, driving out here as in Europe the black rat which had been previously introduced; it is now generally distributed over the world, having been transported in ships, and most abundantly near the seacoasts. Its haunts are cellars, sewers, canal docks, and similar dirty places, wherever it can make a burrow or find abundant food; it is a great household pest, and so prolific that its devastations are sometimes very great; it breeds from three to five



Black Rat (*Mus rattus*).

times a year, having 12 to 15 at a birth, the males always being the most numerous. Not only the black rat, but other species indigenous to the old world, are driven off or destroyed by it; the dead and even living persons are attacked by it when hard pressed; it is not only pursued by man, dogs, and cats, but the stronger will kill and devour the weaker of its own species. The black rat (*M. rattus*, Linn.) is 7 or 8 in. long, with a tail of $8\frac{1}{2}$ in.; the color is very dark, often nearly black, with numerous long hairs projecting from the short and soft fur, plumbeous beneath, and the feet brown; it has a slighter form than the brown rat, with the upper jaw more projecting, the ears larger, and the tail much longer in proportion. It is not very strong, but exceedingly active; being rather timid, it is exterminated by the larger and fiercer brown rat; the habits of the two species are much the same, but the black rat is less a burrowing animal, and prefers the upper parts of houses to cellars and low dirty places. It used to be the common house rat in Europe and warm countries, until driven off by its congener; it appears to have been brought to the new world about the middle of the 16th century; it came originally from central



Norway Rat (*Mus decumanus*).

subfamily, confined originally to the old world, belong the common house rats. The brown or Norway rat (*mus decumanus*, Pall.) has a

Asia; like the preceding species, it is omnivorous. The roof or white-bellied rat (*M. tectorum*, Savi) is about $6\frac{1}{2}$ in. long, and the tail about 8 in. with 240 rings; it is colored above like the brown rat, the lower parts and upper surface of feet yellowish white; the head is rather blunt, the eyes large, whiskers long and black, ears very large, and the thumb rudimentary. It came originally from Egypt and Nubia, thence passed to Italy and Spain, and from the last to America in the 15th century; it is common in Mexico and Brazil, and in the southern states, but is rarely found above North Carolina; it is fond of inhabiting the thatched roofs of houses, whence its name; it is the same as the *M. Alexandrinus* (Geoffr.) and *M. Americanus* (Seba). Some of the East Indian rats are far larger than any of these; the giant rat of Bengal and the Coromandel coast (*M. giganteus*, Raffles) has a body 13 in. long and a tail as much more; this is very destructive in gardens and granaries, devouring chickens and ducks, undermining houses, and piercing the mud walls; it is the largest of the subfamily, a male weighing as much as 3 lbs.; it is often eaten by the lower caste Hindoos.—All these rats are very fond of fighting, and with their omnivorous habits are decidedly murine cannibals, eating not only their conquered brethren but their young. Though living in the filthiest places and in the foulest air, they always have a sleek coat, and take the greatest pains to clean themselves, licking the paws in the manner of a cat; during mastication the jaws move very rapidly; they drink by lapping; when asleep the body is coiled in a ball, with the nose between the hind legs, and the tail curled around the outside, leaving only the ears out ready to catch the least sound of danger; as food fails they migrate in companies from one place to another. There are more muscles in a rat's tail than in the human hand; this most useful appendage, with its chain of movable bones and numerous muscles, is covered with minute scales and short stiff hairs, rendering it prehensile, and capable of being employed as a hand, balancer, or projecting spring. The teeth are long and sharp, but there is nothing specially dangerous in wounds made by them; their strength enables them to gnaw ivory, as dealers in this article well know; in fact, even in Africa, elephants' tusks are found gnawed by rats, squirrels, porcupines, and perhaps other rodents, as long as any gelatine is contained in them. They are very subject to tumors of the skin, which often end fatally; they also perish soon without water. These animals have their uses, especially for devouring refuse matters which would otherwise engender disease, as in tropical climates or in large cities, in the sewers of which they live in legions; their skins are employed for various purposes, as in the manufacture of the thumbs of gloves, but are too delicate for any article requiring much strength. The Chinese and other Asiatic nations, and

many African tribes, eat the flesh of rats; and arctic travellers have often found them a welcome addition to their bill of fare.—In the sigmodont tribe of the *murinae*, belonging entirely to the new world, besides the genera



Florida Rat (*Neotoma floridana*).

noticed under Mouse, may be mentioned *neotoma* (Say and Ord); in this the fur is soft and full, the form rat-like, the tail long and more or less hairy; ears very large and nearly naked; molars rooted; heels hairy. It is peculiar to North America, and found in the United States except New England; some of the species are much larger than house rats, and are rather handsome. The Florida or wood rat (*N. floridana*, Say and Ord) is about 8 in. and the tail 6 in. long, the short stiff hair of the latter not concealing the scaly rings; the color above is plumbeous mixed with dark and yellowish brown, lighter on the sides, beneath and the feet white; tail dusky above, white below; the head is sharp. It is abundant in the southern Atlantic and gulf states, and is found occasionally in the west; the habits vary much in different localities, living in some places in the woods, in others under stones or in the ruins of buildings; in swampy districts it heaps up mounds, 2 or 3 ft. high, of grasses, leaves, and sticks cemented with mud; sometimes the nest is in the fork or the hollow of a tree. It is crepuscular, very active and an excellent climber; the food consists of corn, nuts, cacti, crustaceans, mollusks, and various roots and fruits; the disposition is mild and docile; from three to six young are produced twice a year. Larger species are found west of the Rocky mountains, very destructive to the furs, blankets, and stores of the trappers; for an account of these see vol. viii. of the "Reports of the Pacific Railroad Expedition." In the bone caves of Pennsylvania have been found the remains of a species whose body must have been at least 12 in. long.—In the genus *sigmodon* (Say and Ord) the general appearance is that of a

large field mouse; the body is stout, the hair long, the muzzle blunt and hairy except on the septum; the upper lip slightly notched; thumb rudimentary; soles naked, with six granular tubercles; incisors stout, the upper much rounded; ears and tail moderate; molars rooted, with a plane surface, the last two lower with the enamel in the form of an S, whence the name. The genus is confined to the southern parts of the United States. The best known species is the cotton rat (*S. hispidus*, Say and Ord), about 5 in. long with a tail of 4 in.; the color above is reddish brown, brightest on the sides, lined with dark brown, and under parts grayish white; the hair is long and coarse, and the claws very strong. It is more abundant in the southern states than the meadow mice in the north, living in hedges, ditches, and deserted fields, and consequently doing but little damage to the planter. It is gregarious, feeding on seeds of grasses and



Cotton Rat (*Sigmodon hispidus*).

leguminous plants, and also on flesh; it picks up wounded birds and small mammals, crawfish, and crabs; it is very fierce and pugnacious, the stronger killing and devouring the weaker, and the males often eating the young; it is also very fond of sucking eggs. Nocturnal in habit, it is seen by day in retired places; it digs very extensive galleries not far from the surface, a family in each hole; it breeds several times a year, having four to eight in a litter; it swims and dives well. It received its name from its lining the nest with cotton. It is preyed upon by foxes, wild cats, hawks, and owls. It is not found north of Virginia.

RATAZZI. See RATAZZI.

RATIBOR, a town of Prussian Silesia, on the Oder, which is here navigable, 90 m. S. E. of Breslau; pop. in 1871, 15,323, chiefly Roman Catholics. It has one Protestant and several Catholic churches, and a Protestant gymnasium attended by about 500 students. The principal trade is in grain and timber; tobacco is manufactured. It was formerly the capital of a principality, which belonged to the house

of Hapsburg from 1532 to 1742, when it was taken by the Prussians. From 1822 to 1834 it belonged with its castle (burned in 1858) and domains to the landgrave Victor Amadeus of Hesse-Rothenburg, and it is now held as a dukedom by Prince Victor of Hohenlohe-Waldenburg-Schillingsfürst.

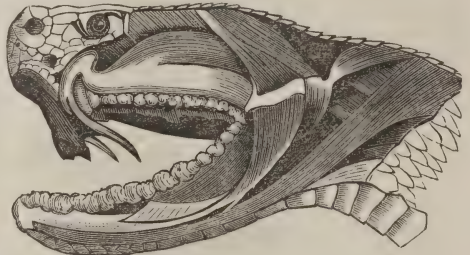
RATISBON (Ger. *Regensburg*; anc. *Reginum*; mediæval Lat. *Ratisbona*), a city of Bavaria, capital of the united district of the Upper Palatinate and Ratisbon, on the right bank of the Danube, opposite its junction with the Regen, 65 m. N. N. E. of Munich; pop. in 1871, 29,224, including about 6,000 Protestants, the rest being chiefly Catholics. It is a city of great antiquity, having crooked streets and tall, quaint houses with gable roofs, and intervening lofty towers. The restoration of the cathedral, founded about 1275, was completed in 1875; it has a richly sculptured portal, and is one of the grandest Gothic structures in Germany. The abbey of Emmeran, dating from 652, and improved by Charlemagne, consists of a vast pile of buildings, including the half ruined church with the shrine of St. Emmeran, the patron saint of the city; the cloisters have been embellished and enlarged by their present owner, Prince Thurn and Taxis. The Bischofshof, once the residence of German emperors, and where Maximilian II. died, is now a brewery. The city has a town hall with interesting historical associations, an observatory, a lyceum, a gymnasium, an ecclesiastical seminary, an institution for the deaf and dumb, a public library, a well endowed hospital, and a fine promenade (*Fürstengarten*) at the rear of the Thurn and Taxis palace, with a monument of Kepler, who is buried in the Protestant cemetery. The most celebrated building in the vicinity of Ratisbon is the Walhalla, the Bavarian pantheon, at Donaustauf; it consists of a Doric marble temple after the model of the Parthenon of Athens, begun in 1816 by Klenze for the crown prince, afterward King Louis I., and opened in 1841. The Danube is spanned in Ratisbon by a stone bridge nearly 1,500 ft. long. The shipping trade chiefly consists of timber, grain, and salt, of which Ratisbon is the principal depot. Gold, silver, steel, tin, and other wares are made, and there are many breweries and distilleries.—Under the Romans Ratisbon was an important frontier fortress of Vindelicia. Subsequently it became a commercial centre, and in the 6th century the capital of Bavarian dukes. The important bishopric of Ratisbon was established in the 8th century. In the 12th century it was made a free imperial city. In 1633-'4 it was successively taken by Maximilian of Bavaria, Bernard of Weimar, and the imperial troops. From 1663 to 1806 it was almost continually the seat of the German imperial diet. Under Charles Dalberg, elector of Mentz, the city and the see of Ratisbon formed together a principality from 1803 to 1810, when both were incorporated with the kingdom of Bavaria.

RATTAN. See PALM, vol. xiii., p. 18.

RATTAZZI. I. Urbano, an Italian statesman, born in Alessandria, June 29, 1808, died in Frosinone, June 5, 1873. He became an advocate, and in 1848 was elected a member of the Sardinian parliament. For a short time in July he was minister of instruction. A steady opponent of peace with Austria, he joined in December Gioberti's cabinet as minister of justice, and succeeded him in February, 1849, as its virtual head, with the portfolio of the interior. He retired on the abdication of Charles Albert after the disastrous battle of Novara at the end of March. His continued parliamentary opposition to Austrian domination in Italy resulted in the election of a new parliament, in which he formed a middle party (*il connubio*) acting in concert with Cavour and the liberal conservatives. In Cavour's cabinet Rattazzi became minister of justice in October, 1853, and at the end of May, 1855, minister of the interior. Early in 1858 he withdrew on account of a considerable accession to the ranks of the clerical party in the chamber, after having carried through the partial suppression of monasteries and other religious bodies. In January, 1859, he was elected president of the chamber, and after the peace of Villafranca replaced Cavour as head of the cabinet, but again gave way to the latter on Jan. 20, 1860. His unpopularity was increased by his refraining from voting on the question of the annexation of Nice and Savoy to France, and it was only in February, 1861, that Cavour could prevail upon the chamber to accept him again as president. After the death of Cavour he opposed Ricasoli, and took his place as premier in March, 1862. Against his former policy, he was obliged to combat the revolutionists at Sarnico, Aspromonte, and other places, without gaining any advantage in the Roman question, and had to resign in December. In 1863 he fought a duel with his political adversary Minghetti. From April to October, 1867, he was for the last time prime minister. By the Garibaldians, who were soon afterward defeated at Mentana owing to the measures which he had taken, he was accused of subserviency to Napoleon III., while the clerical party charged him with encouraging the Garibaldians; but in parliament he vindicated his course (Dec. 18, 19) by pleading the international obligations which the government was bound to observe. II. Marie Studolmine, a French writer, wife of the preceding, born in London about 1830. Her mother was the princess Lætitia, a daughter of Lucien Bonaparte, and her father was Sir Thomas Wyse, English minister at Athens. The separation of her parents left her without resources, and Louis Philippe placed her in a royal school at St. Denis. In 1850 she married M. Frédéric Solms, a rich Alsatian, from whom she separated in 1852. Louis Napoleon objected to her residing in Paris on account of her political intrigues, and she afterward lived in Savoy and at Nice under the name of the prin-

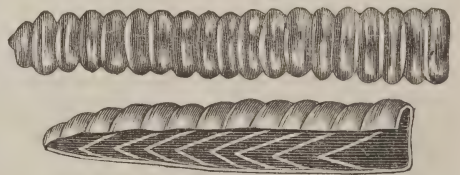
cess Marie de Solms, engaged in literary labor, and intimately associating and corresponding with many eminent men. In 1860 she returned to Paris, and subsequently went to Florence, where in 1862 she married Rattazzi. Lately she has resided in Paris. The best known of her many novels are *Les mariages de la créole* (1866) and *Si j'étais reine* (1868). She has also published poems and dramas (often acting in the latter), and edited several journals.

RATTLESNAKE, an American venomous serpent, the type of the family *crotalidæ*, which includes several species, all characterized by a deep pit lined with small plates on each side, beneath and usually a little behind the nostrils. In the genus *crotalus* (Linn.) the head is very



Head of Rattlesnake, showing Poison Fangs.

large, flattened above and triangular, scaly on the crown, with small shields on its sides and the nose; eyes large and brilliant; teeth very small, but the true maxillaries, which are small and attached to the cranium by a small pedicel and by ligamentary union, have a single pair of long curved fangs, laid flat during inaction, but erected when the mouth is opened; these fangs are channelled for the conveyance of the poison secreted by a gland on each side of the head, beneath and behind the eyes; behind the fangs are the rudiments of others, which are developed as occasion requires; there are also two rows of small fixed teeth on the palate; the belly is covered with broad shields; the trunk and tail are scaly above, and nearly all the subcaudal scutes simple. The last three to eight caudal vertebræ coalesce to form a

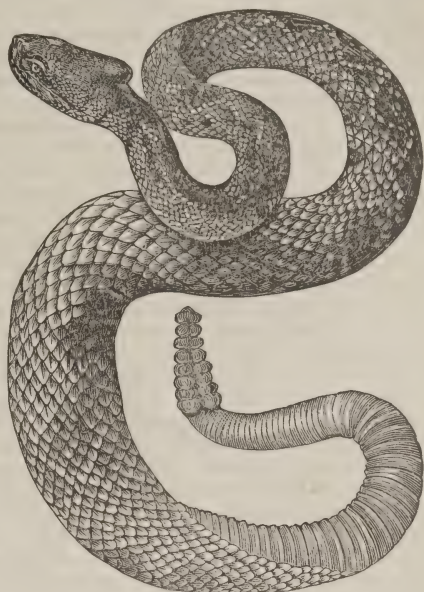


Rattle and Section of Rattle.

single terminal conical and compressed bone, covered by muscle and a thick spongy skin which secretes the pieces of the rattle, an appendage of loosely articulated horny segments, whose rattling noise has given the popular name to this genus; the rattle may consist of 20 or 30 pieces, the smallest at the end; they

are securely strung together, each consisting of three annular portions, the basal ring of one grasping the second of the preceding, and this again enclosing the third of the joint next but one preceding; the first only has a vital connection with the skin; this apparatus is made to vibrate by the muscles of the tail, with a sound like that of peas in a dry pod. The sound of the rattle closely resembles that made by the 17-year locust (*cicada*) and grasshoppers. It is popularly but erroneously believed that the age of the snake can be estimated by the number of the rattles; though these may increase with age, their fragility is such that many may be lost from accident; and moreover, more than one may be added annually, according to the vigor, food, state of captivity, &c., of the animal; 20 are not unfrequently seen in large specimens, but it would be incorrect to conclude from these that the snake was neither more nor less than 20 years old. As the bite of these reptiles is speedily fatal to small animals, it has been generally believed that the use of the rattles is to warn animals and man of its vicinity; but, as other equally and even more dangerous species have no such apparatus, it is more likely that its use is to startle the squirrels, birds, and other creatures upon which it preys from their retreats, or for some other purpose for its own welfare rather than the safety of man. It may serve for its own protection by alarming its enemies and drawing attention to its menacing attitude; yet were this the case we should expect the young to be best provided with this apparatus, whereas it increases in size with age; it has been suggested that it is to call the sexes together. (See vol. vi. of "American Naturalist," 1872.) Rattlesnakes rarely attack man unless provoked, and are sluggish in their movements, unable to spring except from a coil, and are disabled by slight blows. They are ovo-viviparous, the eggs being retained until hatched, and the young expelled alive; in winter they retire to holes in the ground, and there remain torpid, several interlaced with each other; they are unable to climb trees, and do not follow a retreating animal which has escaped their spring. They are said to be fond of music, like many other serpents. Some Indians are afraid to kill them, lest the spirit of the slaughtered animal should excite its living relatives to avenge its death. They are capable of attaining to a considerable age, and are tenacious of life under circumstances speedily fatal to most other animals.—The most common is the banded rattlesnake (*C. [urotophus] durissus*, Linn.), 4 to 5 ft. long, ash-colored above with irregular transverse dusky bars, confluent near the tail; vertebral line yellowish, the sides tinged with the same; the body is thick and robust and the tail short and thick; in a specimen about 4 ft. long the head was 2 in., the body 40, the tail $3\frac{1}{2}$, and nine rattles 2 in., the greatest circumference being 6 in.; there were 177 broad abdominal plates, and 25 under the tail; in the

young the tail is black. It is generally distributed throughout the United States, from lat. 45° to the gulf of Mexico, and from the Atlantic to the Mississippi and Red rivers; it preys



Rattlesnake (*Crotalus durissus*).

principally on rabbits, squirrels, rats, and small birds, quietly waiting for them to come within its reach, its bite proving fatal to animals of this size in less than a minute when the snake is in full vigor. It is now rarely met with in the northern states, except in uncultivated and rocky places, remote from dwellings; it is more common in the western states, where its fat is highly prized as an antidote to its bite, and also for rheumatic and neuralgic pains; cattle are often bitten by it, and it is the custom there to cast them and bury the wounded part in the mud, recovery taking place rapidly; this shows the comparatively little danger for a large animal, as there can be nothing curative in the application made. The diamond or water rattlesnake (*C. adamanteus*, Beauv.) is dark brown or dusky above, with a series of large rhomboidal spots continuous from head to tail; abdomen dirty yellowish white; the mouth is large, the neck small and contracted, and the body long and thick; it is the largest of the genus, and may attain a length of 8 ft.; in one about 6 ft. long the head was $2\frac{1}{2}$ in., the body 60, the tail $2\frac{1}{2}$, and the rattles 3 in.; abdominal plates 172, and 25 subcaudal. It frequents damp and dark places, always near water, though not living in it; it is one of the most hideous and sullenly ferocious serpents of the family; its range is very limited, from North Carolina to East Florida, on the seacoast. The *C. horridus* (Linn.) is a native of the warm parts of South America; it

attains a length of 5 or 6 ft. and the thickness of a man's wrist; the color is yellowish brown varied with darker, on the lower parts lighter; there are wide lozenge-shaped spots along the back edged with white, with light stripes and other smaller and less distinct spots on the sides; brownish black bands between the eyes, and from the top of the head along the neck. It is found only in dry, rocky, elevated regions, covered with thorns and bushes; the negroes esteem its flesh a delicacy; it often bites and destroys cattle coming near its retreat, the poison being more virulent in tropical climates. —The genus *crotalophorus* (Gray) seems to connect *crotalus* with *trigonocephalus* (copper-head), having the rattles of the former and the plates on the head of the latter. The small or ground rattlesnake (*C. miliarius*, Gray) is dark gray above, with a brownish red vertebral line interrupted by a row of subquadrate black spots margined with yellow; a double series of black spots on each side, the upper larger but less distinct, and a white streak backward from the eyes. It is generally from 16 to 18 in. long, and is common in the United States as far N. as lat. 35°, in dry places among leaves, preying on field mice and small birds; its bite is fatal to small animals, but not to man. The prairie rattlesnake (*C. tergeminus*, Say) is a little over 2 ft. long; it is cinereous above, with a triple series of dark brown spots, and a double series of dusky spots below; it is fond of hiding in the holes of the prairie dog (*cynomys*), on the young of which it chiefly feeds; it occurs in the country near the Rocky mountains and the sources of the Missouri. Other species are described by Dr. Holbrook, and by Baird and Girard. —The poison gland is compressed by the temporal muscle during the act of striking; there is a very extensive communication of the glandular tissue with the vascular system, the blood vessels surrounding the secreting tubes in a capsular manner. Microscopically the poison appears as a limpid hyaline serum, with crystals of ammonio-magnesian phosphate, according to Dr. W. I. Burnett. According to Dr. Mitchell it is yellow, acid, glutinous, of a specific gravity of 1.04; devoid of taste, smell, and acidity; beginning to coagulate at 140° F., and soluble in water. It consists: 1, of an albuminoid substance, coagulable by pure alcohol but not by a heat of 212° F., called by him crotaline, the poisonous element; 2, of a non-poisonous albuminoid compound, coagulable both by heat and alcohol; 3, of a yellow coloring matter and an undetermined substance, both soluble in alcohol, traces of fatty matter and free acid-saline bodies, chlorine, and phosphates. No temperature from zero to 212°, nor acids and alkalis at moderate temperatures, nor alcohol, chlorine, nor iodine, destroy the poisonous property of the venom. This fluid is fatal even to the bitten snake; it destroys the vitality of the blood and its power of coagulation, as by a lightning stroke; it probably acts as a powerful sedative through

the blood on the nervous centres; hence the best antidotes are active stimulants, especially alcohol in some form; and, *vice versa*, intoxication may be neutralized by taking this poison into the stomach in the form of pills. The poison varies in intensity according to season, climate, and vigor of the animal, being most active in tropical regions and in warm weather, when it has been long retained or the animal is greatly irritated; cold-blooded animals generally suffer little from its bite, and pigs kill and devour it with impunity and avidity, their covering of fat preventing the introduction of the poison into the circulation; its virulence is soon exhausted by rapidly succeeding bites, as has been proved by experiments on chickens and rats; as its secretion goes on for some time after death, experimenters should be careful in their manipulations about the fangs and poison apparatus. Many plants and other substances are reputed to be efficacious against the bite of the rattlesnake; but none have been proved to be so when the poison fangs have actually entered the tissues. —For details on the habits of these serpents, on the anatomy of the parts concerned in the secretion and expulsion of the poison, and in the infliction of the wound, and for a full enumeration of genera and species, with illustrations and copious bibliography, see a memoir in vol. xii. of the "Smithsonian Contributions to Knowledge" (1860), by S. Weir Mitchell, M. D., and an abstract of the same in the secretary's report for 1860 (8vo, Washington, 1861).

RAUCH, Christian Daniel, a German sculptor, born in Arolsen, Jan. 2, 1777, died in Dresden, Dec. 3, 1857. He studied in Cassel, and in 1797 went to Berlin, where he was attached to the royal household till 1804, when Queen Louisa enabled him to study in Dresden and in Rome. He early became known by his bust of a daughter of Wilhelm von Humboldt and bass reliefs of "Hippolytus and Phædra," "Mars," and "Venus wounded by Diomedes." In 1813 he finished his celebrated statue of Queen Louisa, and subsequently executed hundreds of works, of which almost every considerable German city has one or more. The principal are statues of King Maximilian at Munich, Blücher at Berlin and at Breslau, Dürer at Nuremberg, Luther at Wittenberg, Kant at Königsberg, six large Victories in the Walhalla, and especially his colossal equestrian statue of Frederick the Great at Berlin, finished in 1851. His last model, that of "Moses praying together with Aaron and Hur," has been cut in marble by Albert Wolf. He held the posts of court sculptor and professor of sculpture in the academy of Berlin.

RAUCH, Friedrich August, a German philosopher, born at Kirchbracht, Hesse-Darmstadt, July 27, 1806, died in Mercersburg, Pa., March 2, 1841. He graduated at the university of Marburg in 1827, afterward studied at Gießen and Heidelberg, and in his 24th year became extraordinary professor in the univer-

sity of Giessen, and soon afterward ordinary professor at Heidelberg. Before assuming the duties of the latter appointment, he incurred the displeasure of the government by too free an expression of his political sentiments, and fled. He arrived in America in 1831, and in June, 1832, was ordained to the ministry, and called to York, Pa., to take charge of a classical school in connection with the theological seminary of the German Reformed church. In 1835 he was chosen president of Marshall college, Mercersburg, acting at the same time as professor of Biblical literature in the theological seminary, which had been removed to that place. He continued in this double office up to the time of his death. He published "Psychology, or a View of the Human Soul" (1840), and left unfinished a work entitled "Christian Ethics." A volume of his sermons was edited by the Rev. Dr. Gerhart, entitled "The Inner Life of the Christian" (Philadelphia, 1856).

RAUMER. I. Friedrich Ludwig Georg von, a German historian, born at Wörlitz, near Dessau, May 14, 1781, died in Berlin, June 13, 1873. He completed his studies at Halle and Göttingen, and was employed in the civil service from 1801 to 1811, when he became professor at Breslau, and in 1819 at Berlin, where he remained till 1853. At various periods he visited England, the United States, and other countries. In 1848 he was a member of the Frankfurt parliament, and was employed on a diplomatic mission to Paris; and he was afterward a member of the Prussian upper house till 1871. His principal works are *Geschichte der Hohenstaufen und ihrer Zeit* (6 vols., Leipsic, 1823-'5; 4th ed., 1871), and *Geschichte Europa's seit dem Ende des 15. Jahrhunderts* (8 vols., 1832-'50). His other publications include *Herbstreise nach Venedig* (2 vols., 1816); *Vorlesungen über die alte Geschichte* (2 vols., 1821; 3d ed., 1861); *Briefe aus Paris und Frankreich*, 1830 (2 vols., 1831); *Briefe aus Paris zur Erläuterung der Geschichte des 16. und 17. Jahrhunderts* (2 vols., 1831); *England im Jahr 1835* (2 vols., 1836; enlarged ed., 3 vols., 1842; English translation by Sarah Austin and H. E. Lloyd, 1836-'42); *Beiträge zur neuern Geschichte aus dem Britischen Museum und Reichsarchive* (5 vols., 1836-'9); *Italien* (2 vols., 1840); *Die Vereinigten Staaten von Nordamerika* (2 vols., 1845; English translation by W. W. Turner, "America and the American People," New York, 1846); *Briefe aus Frankfurt und Paris* (2 vols., 1849); *Antiquarische Briefe* (1851); *Vermischte Schriften* (3 vols., 1852-'4); *Lebenserinnerungen und Briefwechsel* (2 vols., 1861); *Handbuch zur Geschichte der deutschen Literatur* (4 vols., 1864-'6); and *Literarischer Nachlass* (2 vols., 1869). In 1830 he began the publication of the yearly *Historisches Taschenbuch*, which he edited till his death, and which is now continued by Riehl. **II. Karl Georg von**, a German geographer, brother of the preceding,

born at Wörlitz, April 9, 1783, died in Erlangen, June 2, 1865. He studied at Göttingen, Halle, and Freiberg. In 1810 he received an appointment in the mineralogical bureau at Berlin, and in 1811 at Breslau. In 1813-'14 he fought against the French as aide-de-camp of Gneisenau. From 1819 to 1823 he was employed both in the mining bureau and the university of Halle, and subsequently at Nuremberg till 1827, when he became professor of natural history and mineralogy at Erlangen. His chief works are: *Lehrbuch der allgemeinen Geographie* (Berlin, 1832; 3d ed., Leipsic, 1848); *Beschreibung der Erdoberfläche* (6th ed., 1866); *Palästina* (1835; 4th ed., 1860); *Kreuzzüge* (2 vols., Stuttgart, 1840 and 1864); *Geschichte der Pädagogik* (3d ed., 4 vols., 1857-'61); and his autobiography (1866). **III. Rudolf von**, a German philologist, son of the preceding, born in Breslau, April 14, 1815, died Aug. 30, 1876. He studied at Erlangen, Göttingen, and Munich, and in 1840 began to teach at Erlangen, where in 1852 he became professor of philology. Among his works are: *Gesammelte sprachwissenschaftliche Schriften* (Frankfurt, 1863); *Untersuchungen über die Urvorwandtschaft der semitischen und indoeuropäischen Sprachen* (1868 et seq.); and *Geschichte der germanischen Philosophie, vorzugsweise in Deutschland* (Munich, 1870).

RAUSCHER, Joseph Othmar von, an Austrian cardinal, born in Vienna, Oct. 6, 1797, died in November, 1875. He became successively professor of canon law and church history at Salzburg, rector of the oriental academy of Vienna, preceptor to the present emperor and the archdukes Maximilian and Charles Louis, prince-bishop of Seckau in 1849, prince-archbishop of Vienna in 1853, and cardinal Dec. 17, 1855. This last dignity was bestowed in acknowledgment of his services in bringing about the concordat of Aug. 18, 1855, between Austria and the holy see. He was foremost among the German episcopate in opposing the introduction of the question of papal infallibility, and in April, 1870, published a pamphlet arguing strongly the dangers of such a discussion. When the general debate on infallibility was closed by the presiding legates in the beginning of June, a meeting of prelates was called at his residence, at which a protest was drawn up against the act of the legates. His last speech in the council warned the fathers that fatal consequences would ensue from a declaration. He was one of the 83 bishops who voted *non placet* on July 13, and one of the 55 who signed a formal protest against the manner of proceeding. He afterward acquiesced in the decision of the majority, and promulgated the dogma for acceptance by his flock. After 1870 Cardinal Rauscher strenuously opposed the Old Catholic movement.

RAVAILLAC, François, the assassin of Henry IV. of France, born in Angoulême about 1573, executed May 27, 1610. He was first a lawyer's clerk, and then a schoolmaster. Having

been cast into prison for some offence, he fell into a gloomy fanaticism. He went to Paris, and joined the Feuillants, but was expelled as a fanatic and fool, and returned to Angoulême, where he manifested the most intense hatred of Protestantism. He determined to undertake the murder of Henry IV., whom he was taught to consider the great enemy of the Catholic faith, and went to Paris. On May 14, 1610, about 4 P. M., the king drove to the arsenal to visit Sully, who was sick. In the narrow street La Ferrière the carriage was obliged to stop, as the way was blocked up by market wagons. The king was sitting on the left side next to the duke d'Épernon, when Ravaillac, throwing himself upon the right hind wheel, struck twice at him with a dagger, the second time plunging the knife into the heart of the king. He was immediately caught with the knife in his hand, acknowledged his deed, and after a trial before the parliament of Paris was torn to pieces by horses with unexampled tortures.

RAVEE, a river of India, an eastern affluent of the Chenaub, and one of the five rivers to which the Punjaub owes its name. It rises in the Mid-Himalaya range, in the state of Kooloo, W. of the Rotang pass, about lat. $32^{\circ} 30' N.$, lon. $77^{\circ} E.$, at an elevation of about 16,000 ft. It flows S. W. about 450 m., passing the towns of Chamba, Lahore, and Tulumba. It is the main feeder of the great Baree doab canal. The railway from Lahore to Mooltan, about 40 m. below its junction with the Chenaub, almost skirts its left bank. Its width varies between 50 and 500 yards, and it attains when fullest in some places a depth of 12 ft., but it is generally fordable three fourths of the year. Its ancient Sanskrit name was Iravati, which is still preserved in the local dialect as Iraotee. Ancient Greek writers call it the Hydraotes or Hyarotis, while Ptolemy gives it the name of Adris.

RAVEN, the largest of the *corvidæ* or crow family, and the type of the genus *corvus* (Linn.). In this genus the bill is long and very strong, and arched; the nasal feathers are lengthened and reach about to the middle of the bill, and the nostrils are large, circular, and overhung behind by membrane; the gape without bristles; wings long and pointed, when closed reaching nearly to the tip of the tail and far beyond the under coverts; the second quill longer than the first, and the third and fourth the longest; primaries ten, the outer four sinuated on the inner edge; tail short and nearly even; tarsi longer than middle toe, scaled in front. The American raven (*C. carinivorus*, Bartram) is about 25 in. long with an alar extent of 50, and the bill 3 in.; the female is a little smaller, but in other respects like the male. The plumage is compact, glossy black, with violet and greenish reflections; the feathers of the chin and throat, as in all ravens, are elongated, stiffened, narrow, lanceolate, and with very distinct outlines. It is found over

the entire continent of North America from Labrador to the gulf of Mexico, in some places migratory, but in others (as at Lake Superior and in Canada) braving the cold of the severest winters; it is most abundant in rocky districts, near the banks of lakes and rivers, and in thinly peopled regions. It is generally seen alone or in pairs, but sometimes in small flocks after the breeding season; the flight is rapid, elevated, and protracted, the bird often sailing for hours at a time at a great height; on the ground the gait is grave and dignified, with frequent opening of the wings. It is truly omnivorous, but by preference carnivorous, eating small animals of all kinds, eggs and young birds, carrion, dead fish, mollusks, crustaceans, insects, nuts, and berries. It is very wary and cunning, and is rarely caught in traps or shot, but it often falls a victim to the poisoned baits set by the trappers for the fur-bearing animals. It breeds, according to latitude, between January and June, making a rude nest on inaccessible cliffs, repairing the same for years in succession; the eggs are four to six, 2 in. long, light greenish blue with numerous light purple and yellowish brown blotches, especially at the larger end; incubation lasts about three weeks, and the young remain in the nest several weeks before they are able to fly, fed at first on the half digested food disgorged by the parents; only one brood is raised in a year, and this is bravely and successfully defended against the largest birds of prey. It is easily domesticated by kindness, and becomes much attached to its master, following him like a dog; it can be taught to imitate the human voice and to pronounce a few words with great distinctness; when irritated or wounded, it strikes savagely with bill and claws. Its flesh is tough and unfit for food; it disgorges indigestible substances, as bones, hair, and feathers, like birds of prey. Like others of the genus, this species varies much in size and proportions, according to locality, those of the south, contrary to the general rule, being larger than the northern individuals of the same species; this fact has led some to think that the Colorado raven (*C. cacalotl*, Wagl.) is only a southern variety of the *C. carinivorus*, the chief differences being a slightly greater size, longer wings and tail, and a western and southern habitat exclusively. The white-necked raven (*C. cryptoleucus*, Couch), from Mexico and Texas, is about 21 in. long, with the feathers of the neck all round, back, and breast, snow-white at the base.—The European raven (*C. corax*, Linn.) very much resembles the American in size and proportions, and the two have been regarded by Audubon and others as the same, but most modern naturalists consider them distinct; it is about 26 in. long and 52 in alar extent. It is very interesting on account of its habits, and its historical, economical, and superstitious relations; it is very grave and dignified, sagacious, courageous, and powerful; its beak is as

well adapted for tearing flesh as is that of rapacious birds; though wary and distrustful, it is docile and affectionate when domesticated; it has an excellent memory, and a decidedly thievish disposition. The color is black, with steel-blue and purplish or violet reflections;



Raven (*Corvus corax*).

its form is symmetrical and its proportions are fine. It is proverbially long-lived, and has been known to attain the age of about 100 years; it is spread extensively over Europe, and allied species are found in Africa and Asia. It is voracious and omnivorous, but particularly fond of carrion, whether of flesh, fish, or fowl, dead from disease or accident; it will attack an animal of the size of a sheep if it is helpless or dying; it is said to destroy young lambs, and certainly makes great havoc among half-grown hares and rabbits, young and full-fledged birds, and eggs; when it finds a carcass the first attack is upon the eyes and tongue, and then upon the abdomen to drag out the intestines; in autumn it sometimes commits serious depredations upon barley fields. The flight is at times very high, which enables them to follow any companions which have chanced to spy their favorite food; this explains the rapid collecting of a large number in a short time; they have no special acuteness of smell, but are guided to their food by the sense of sight; the voice is a harsh and disagreeable croak. They are usually seen alone or in pairs, except when drawn together by a large carcass in the field or on the shore; the nest is made in lofty trees or in holes of inaccessible cliffs, and the same one is used year after year; a fetid odor issues from the body, probably on account of their carrion food. Farmers and shepherds like to have them breed on their premises, as they keep off eagles, cats, dogs, &c. This was considered a bird of ill omen by the ancients, and its movements were watched by the augurs with great attention;

and it has been generally looked upon with superstitious fears, on account of its black hue, mournful croak, fetid odor, and disgusting habits. It by preference inhabits the most desolate places. In America, where the crow abounds, as about Lake Superior, the raven is very rarely seen, and *vice versa*.

RAVENNA. I. A N. E. province of Italy, in Emilia, bordering on the Adriatic, Ferrara, Bologna, Florence, and Forli; area, 742 sq. m.; pop. in 1872, 221,115. It is mountainous, especially in the south, and is traversed by the Savio, Santerno, and many other streams. The principal products are rice, grain, hemp, flax, and pine, anise, and coriander seeds. It comprises the former papal legation of Ravenna, excepting the district of Imola, which has been added to Bologna, but including that of Lugo, taken from Ferrara; the other two districts are Ravenna and Faenza. II. A city, capital of the province, in a marshy plain on the river Montone, near the Adriatic, and 173 m. N. of Rome; pop. in 1872, 58,904. The principal buildings are the cathedral, of the 4th century, with fine pictures by Guido Reni; the church of Santa Maria della Rotonda, formerly the mausoleum of Theodoric, king of the Ostrogoths, N. of the city proper; the basilica of San Vitale, remarkable chiefly for its splendid mosaics; the churches of St. John the Baptist and St. John the Evangelist, built early in the 5th century by the empress Galla Placidia; and the remains of the palace of Theodosius, occupied after him by the exarchs. Among the many historical curiosities is the tomb of Dante, who died here. (See DANTE, vol. v., p. 672.) Ravenna is the seat of an archbishop, and has many convents, a museum, library, and academy of fine arts. The chief pursuits are the culture of the vine and the rearing of silkworms, with the spinning and weaving of silk. The town was once situated on the Adriatic in the midst of marshes, but it is now some distance from the sea, and separated from it by the Pineta, a remarkable forest of pines extending for many miles along the coast.—The city appears to have been founded by the Umbrians. It is not mentioned in history until a late period of the Roman republic, but during the later civil wars it held a prominent position. Augustus raised it to still greater importance by building a new port called Portus Classis, or simply Classis, capable of containing 250 ships of war, and making it the station of the fleet guarding the Adriatic. Its natural strength contributed to render it an important military post, and in A. D. 404 Honorius made it the imperial abode. On the fall of the western empire it became the capital of the Gothic kings, and it was subsequently the residence of the exarchs of the Byzantine emperors, and the whole province under their jurisdiction was called the exarchate of Ravenna. The city itself remained in the possession of the Greek emperors until taken by Luitprand, king of the Lombards, in 728, and again, after a re-

capture, by Astolphus, one of his successors, in 752. Luitprand destroyed the ancient port of Classis. When Pepin had conquered the Lombards he made a present of Ravenna to the pope, and with occasional interruptions it belonged to the Papal States till 1860. From 1441 to 1508 it was in the hands of the Venetians, but the league of Cambrai placed it again under the pope. It is celebrated for the great victory gained under its walls by the French under Gaston de Foix, who fell in the action, over the Spaniards and the troops of Pope Julius II., April 11, 1512. (See GASTON DE FOIX.)

RAVIGNAN, Gustave Xavier Delacroix de, a French preacher, born in Bayonne, Dec. 2, 1795, died in Paris, Feb. 26, 1858. He studied law, and in 1821 became counsellor to the royal court of Paris, and deputy attorney general near the tribunal of the Seine. He resigned and entered the Jesuit novitiate at Montrouge in 1822, was ordained priest in 1828, and taught theology at St. Acheul till 1830, and afterward at Brigrin the Valais till 1833. His Lenten sermon in the cathedral of Amiens in 1831 laid the foundation of his fame as a preacher. In 1836 he preached a Lenten sermon in Paris, and shortly after succeeded Lacordaire in the pulpit of Notre Dame, which he occupied till 1848. In 1844 the attacks made on the Jesuits in the public press and the legislature induced him to publish an apologetic work entitled *De l'existence et de l'institut des Jésuites* (7th ed., 1855). In 1837 he founded a house of his order in Bordeaux, which he governed for four years; and in 1848 he became superior of the Parisian residence in the rue de Sèvres, the interval being filled up by charity sermons, and the foundation and direction of various charitable and pious associations, all aiming at the improvement of the common people. In 1851 he visited London during the universal exhibition, and gave a course of lectures. In 1852 he wrote at the instigation of Pius IX. his *Clément XIII. et Clément XIV.*, a history of the suppression of the Jesuits, designed to counteract the extreme views of Theiner and Crétineau-Joly. His life was written by Poujoulat (1858) and by Père de Ponlevoy (2 vols., 1860; English translation, New York, 1873).

RAWDON, Lord. See HASTINGS, FRANCIS.

RAWLE, William, an American lawyer, born in Philadelphia, April 28, 1759, died April 12, 1836. He studied law in New York, London, and Paris, and commenced practice in Philadelphia in 1783. He was United States district attorney under Washington, was president of the Pennsylvania historical society, and chancellor of the associate members of the bar of Philadelphia. He published "A View of the Constitution of the United States" (1829).

RAWLINS, a N. W. county of Kansas, formed since 1870; area, 900 sq. m. It borders on Nebraska, and is drained by Beaver and Sappa creeks, affluents of the Republican river.

RAWLINSON. I. Sir Henry Creswicke, an English archæologist, born at Chadlington, Oxford-

shire, in 1810. In 1826 he entered the military service of the East India company, and served in Bombay till 1833, and subsequently in the Persian army. In 1835, while stationed at Kermanshah, he began to study the cuneiform inscriptions at Mt. Elvend. In 1837 he copied the first column of the great Behistun inscription and four minor inscriptions, and on Jan. 1, 1838, submitted a report to the Asiatic society in London. The outbreak of the war in Afghanistan interrupted his labors. After exploring various regions of central Asia, he was for some time political agent at Candahar, and returned in the same capacity to Bagdad. In 1844 he forwarded to London complete copies of the Persian portion of the Behistun inscription, of which the Asiatic society published facsimiles in 1846, and which included more of the cuneiform writing of the first kind than the aggregate of all other inscriptions then known in Europe. (See CUNEIFORM INSCRIPTIONS.) He was consul at Bagdad from 1844 to 1851, and consul general till 1855. After returning to England he was knighted and appointed a director of the East India company. In 1858 he was elected to parliament for Reigate, and from 1859 to 1860 he was minister at Teheran with the rank of major general. He represented Frome in parliament from 1865 to 1868, when he was reappointed member of the council for India. In 1871-'3 he was president of the royal geographical society, which office he again holds (1875); and he also presides over the society of Biblical archæology. Besides his numerous contributions to the journals of Asiatic societies and other learned periodicals, he has published "On the Inscriptions of Assyria and Babylonia" (London, 1850); "Outline of the History of Assyria, as collected from the Inscriptions discovered by A. H. Layard in the Ruins of Nineveh" (1852); "Memorandum on the Publication of the Cuneiform Inscriptions" (1855); contributions to his brother's "Herodotus" (4 vols., 1858-'60); "A Selection from the Historical Inscriptions of Chaldaa, Assyria, and Babylonia" (fol., 1861); in conjunction with Norris, "The Cuneiform Inscriptions of Western Asia" (3 vols., 1861-'70, lithographed for the British museum); and jointly with George Smith, "A Selection from the Miscellaneous Inscriptions of Assyria" (fol., 1870). In 1874-'5 appeared his "England and Russia in the East," a series of papers on the political and geographical condition of central Asia.

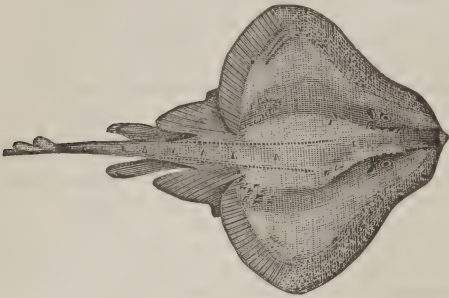
II. George, an English historian and orientalist, brother of the preceding, born at Chadlington in 1815. He graduated at Oxford in 1838, became a fellow and tutor of Exeter college, and was Bampton lecturer from 1859 to 1861, and Camden professor of ancient history from 1861 to 1874, when he became canon of Canterbury cathedral. He has published "Historical Evidences of the Truth of the Scripture Records" (London, 1860); "The Contrasts of Christianity with the Heathen and Jewish

Systems" (1861); in conjunction with his brother Henry and Sir J. G. Wilkinson, an annotated translation of "Herodotus" (4 vols., 1858-'60); and "Historical Illustrations of the Old Testament" (1871). His most celebrated works are "The Five Great Monarchies of the Ancient Eastern World, or the History, Geography, and Antiquities of Chaldæa, Assyria, Babylonia, Media, and Persia" (4 vols., 1862-'7; 2d ed., republished in New York, 1871), "A Manual of Ancient History" (1869), and "The Sixth Great Oriental Monarchy, or the Geography, the History, and the Antiquities of Parthia" (1873).

RAY, the name of the plagiostome, chondropterygian, or cartilaginous fishes of the suborder *raia*, popularly called skates. The numerous families are characterized by great flatness and width of the body, the latter arising principally from the extreme expansion of the pectoral fins; the skull is flat, the upper wall generally membranous, and movably articulated, as in sharks, by two condyles and an intervening space with the spine; anteriorly the head ends in a tapering cartilage which supports the snout; spout holes or spiracles for respiration and eyes on the dorsal aspect, the latter without lids or with an upper adherent one; on the ventral surface are five slit-like gill openings, before the ventrals and under the pectorals; the scapular arch is complete above and below, supporting the long, jointed, cartilaginous rays of the pectorals; between this and the pelvic arch, supporting the ventral, lie the abdominal viscera, and between it and the narrow skull are the branchial apparatus and the vascular centres. The spiracles are openings by which the water may pass from the upper surface of the head into the mouth cavity, and are found in perfection only in those species which live upon the bottom; the eyes being above, and the fins feeble, they seek their prey by the sense of touch in the snout, stirring up the mud and sand while feeding; their gills would thus be injured by gritty materials were the water taken in from below by the mouth; in the rays the comparatively pure water enters from above by the spiracles, and passes out at the branchial openings, or *vice versa*. The development of these openings is in direct proportion to that of the sense of smell, and in inverse proportion to that of sight. (See "Proceedings of the Boston Society of Natural History," vol. xvii., November, 1874.) In the torpedoes the cellular galvanic batteries occupy the spaces between the skull and the pectorals; and a homologous rudimentary apparatus has been found in the tail of common skates, showing the adherence to a general plan of structure irrespective of function. The tail in some is fleshy and tapering, in others slender and cartilaginous, in others elongated like a whip lash, and in others armed with lancet-shaped spines on the upper surface, making a very formidable weapon. The gills consist of membranous folds on plane surfaces, and the arterial bulb

has from two to five transverse rows of semilunar valves. The reproductive secreting organs are compact and oblong, the efferent tubes communicating with the ureters and ending in a rudimentary organ in the cloaca; the claspers are present in the males, as appendages to the posterior edge of the anal fin, fissured toward the end, leading to a blind subcutaneous sac well lubricated with mucus and the secretion of a glandular body; the ovaria are comparatively small, and the ova are larger and fewer than in common fishes, and more as in birds; most of the genera are viviparous, but some of the genus *raia* are oviparous. The claspers are not mere organs of prehension; they may be so rotated as to bring an opening in them opposite to the spermatic duct, and may, according to Agassiz ("Proceedings of the Boston Society of Natural History," vol. vi., p. 377, May, 1858), be introduced into the oviducts, and reach the glands there situated for the formation of the egg case. They are true intromittent or copulatory organs. The egg cases of the skate are often seen on our beaches after a storm; they are quadrangular, about two inches by one, brown and leathery, each corner prolonged into a tubular process; they look somewhat like pillow cases, and are often called sailors' purses and skates' barrows. The young within the egg has no investing membrane, and the yolk seems to bear no relation in size to that of the embryo; water for respiration is admitted and ejected through the corner prolongations, and the young fish escapes through a transverse fissure at one end. The horny egg case may be formed in each oviduct, and is surrounded by a glandular enlargement which secretes its materials; it is formed before the egg descends into it, in the shape of a pocket open above for the reception of the egg, which must be impregnated in the ovary, contrary to the usual order of things, in which the yolk is enclosed before the shell is formed; as the eggs are found to be of different sizes and various degrees of development in the ovary, it is probable that several years are required for their maturity; these peculiarities show the propriety of placing the skates (with the sharks forming the division of selachians of Aristotle and Agassiz) in a class by themselves. The teeth of the rays are generally tubercular, in close quincunx order like a mosaic pavement. Disgusting as is the form of the rays, their flesh is esteemed a delicacy in England and France, though it is rarely eaten in America except by those of European origin; it is tough when first caught, but becomes tender by being kept several days; with us it is most commonly used as bait for lobster pots, or for manure. Of the families of rays, the *pristidæ* and *torpedinidæ* will be described under **SAWFISH** and **TORPEDO** respectively; the *cephalopteridæ* have been noticed under **DEVIL FISH**.—The family *rhinobatidæ* are intermediate between sharks and rays, having the form of body, position of fins, thick, fleshy tail, and smallness of pectorals of the

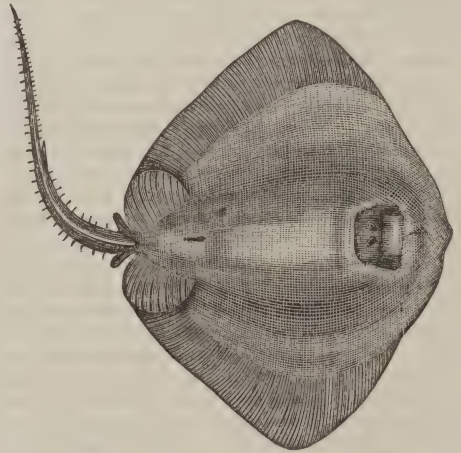
former; the anterior part of the body forms a disk by the union of the pectoral fins with the snout, the latter divided from the former by a furrow, whence these have been called beaked rays; the first dorsal is over the ventrals; the caudal bilobed, with the upper lobe the larger, and the keel of the sides continued along it; margins of mouth generally undulated, three protuberances of the under jaw fitting into corresponding indentations in the upper; nostrils longitudinal near the mouth, with flaps.—In the family *raiidæ* or the typical rays, the



Smooth Skate (*Raia levis*).

snout is more or less pointed, the disk of the body and pectorals usually rhombic; tail slender, with two small dorsals near the end and sometimes a caudal; spiracles near the eyes; mouth curved, with the convexity forward; teeth of males with a central cusp in spawning time; skin either smooth or studded with prickles pointing backward, sometimes with spines on the dorsal ridge and sides of tail. This family includes the genus *raia* (Cuv.), with about 30 species, embracing the best known in America and in Europe, and such as are commonly eaten in the latter. The smooth ray or common skate of the northern coast of America is the *raia levis* (Mitch.); it is of a uniform light brownish color above, and dingy white below; the female is marked above with blackish spots; it attains a length of from 3 to 5 ft., and a weight of 200 lbs.; it is found from New York to the British provinces; the body is generally smooth, but there are small spines about the orbits, on the anterior edge of the pectorals, and on the tail; the snout is blunt, and the teeth in compact rows, six-sided and nearly smooth. Its flat form is peculiarly adapted for life on or near the bottom; the usual mode of progression is by a gentle undulating movement of the pectorals, intermediate between flying and swimming; when in pursuit of prey or escaping from its enemies, the motions are rapid. The young are produced twice a year, in spring and in autumn, deposited in thin, horny, nearly quadrangular cases. Its flesh is said by Mr. Perley to be extensively consumed, and the fleshy part of the pectorals to be beautifully white and delicate; it is usually dressed in long thin slips, rolled like ribbon. On the coast of New England, Nova Scotia, and New

Brunswick it is frequently taken by the cod fishers, being generally hooked by its pectorals; it is pulled up like a dead weight to near the surface, unless caught by the mouth or head, and struggles violently on being drawn out. It feeds on fish, crustaceans, and mollusks, and is very voracious; it digs up clams with its powerful spade-like snout, crushing them easily with its rolling flattened teeth. The skin is covered with an abundant tenacious slime. There are eight or nine species in European waters, some attaining a weight of 200 lbs. The sharp-nosed ray (*R. oxyrhyncha*, Linn.) attains a length of 6 ft.; this is the favorite species in the French markets. The common skate or ray (*R. batis*, Linn.) is a large species, with a granulated skin above; the color is brown above, cinereous below or grayish white with black specks. Several species are common in the London market, where the females are known as maids.—In the family *trygonidæ* or sting rays the tail is slender, often whip-like, naked or bearing one or more barbed spines; no caudal fin; pectorals large, uniting in front of the head; spiracles large and close behind the eyes; teeth small, transversely elliptical, and ridged; skin either smooth or prickly, but without prickles on the pectorals. The American whip sting ray (*pastinaca hastata*, De Kay) occurs on the coast of the middle states, in Long Island sound, and sometimes on



American Sting Ray (*Pastinaca hastata*), under surface.

the coast of Massachusetts; it is olive brown above, and white below; it attains a length of from 5 to 8 ft., including the tail. It is not uncommon on the shores of New Jersey, where it is caught both by hook and seine, varying in size from a breakfast plate to a width of 4 ft. and a tail of 5 ft.; the fishermen always cut off the tail at once, to prevent wounds from its spines, which, being serrated, produce extensive lacerations accompanied by severe inflammation. The principal use made of this species, and indeed of all the rays in

this country, is to extract the oil from the liver, which, with that from this organ in sharks, is employed for various domestic and medicinal purposes. The European sting ray is common in the Mediterranean and on the southern Atlantic coast; it was well known to the ancients, who thought it capable of inflicting poisoned wounds; it twists its long tail around its prey or its enemies, causing very severe lacerated wounds; its flesh is not eatable. The spines of some of the species of this genus are used by savages as arrow and spear heads.—In the family *myliobatidæ* or eagle rays, the head is more elevated than in the other families, projecting as far as the gills, without fin rays on its sides, but with a kind of cephalic fin in front of the skull making the point of the disk; the pectorals are very large and wing-like; the tail is long and slender, with a small dorsal and strong spine; the mouth is transverse, with the dental plates reaching far back into the cavity of the mouth; the teeth are like a mosaic pavement, large and even, in several rows forming a convex surface; the eyes and spiracles are on the sides of the head, and a broad ridge runs between the two; the interrupted pectorals on the sides of the head are a family character. In the genus *myliobatis* (Cuv.) the nasal membrane is square, and the pectorals end in an angular projection; the teeth form long hexagonal plates in the middle, with two or three short or equal rows on the sides. The *M. acuta* (Ayres) is found on the Massachusetts coast and in Long Island sound, and attains a length of about 4 ft.; the body is smooth and reddish brown above, whitish below; tail very slender and armed with spines. The eagle ray of the Mediterranean (*M. aquila*, Risso) grows large; the wounds made by its spines are much dreaded by fishermen. Several species are found in the seas of the warm parts of the globe. In *rhinoptera* (Kuhl) the nasal membrane is notched; the central teeth are the largest, the three lateral rows growing smaller and smaller externally. In *ætobatis* (Müll.) the nasal membrane is lobed, which would embrace many species of *rhinoptera* as usually defined, and the pectorals are rounded; the teeth form a single row of simple arched plates, without lateral rows. In *zygobatis* (Ag.) the nasal lobes and the pectorals are as in the preceding genus; the central rows of teeth are much the largest, the first lateral about half as large, and the two external very much smaller. In *goniobatis* (Ag.) the palate is broadest behind, and the plates are obtusely angular, with their rounded edges forward.—There is hardly a family of fishes in the classification of which more confusion reigns than that of the rays; naturalists see them only in rare instances, and almost always single specimens at a time; there can be little doubt that the two sexes of the same species have in some instances been made into distinct species. Even our most common rays are very imperfectly known, and

the genus *raia* embraces many species which are not congeners.—For details on the embryology of the rays, see Prof. J. Wyman's paper in "Memoirs of the American Academy," vol. ix., 1867, and Mr. Putnam's in the "American Naturalist," vol. iii., 1870.

RAY, a N. W. county of Missouri, bordered S. by the Missouri river; area, about 570 sq. m.; pop. in 1870, 18,700, of whom 1,833 were colored. It has an undulating surface, covered with forests and prairies, and a generally fertile soil. It is intersected by the St. Louis, Kansas City, and Northern railroad. The chief productions in 1870 were 187,736 bushels of wheat, 1,245,233 of Indian corn, 177,461 of oats, 39,114 of potatoes, 6,610 tons of hay, 190,355 lbs. of tobacco, 42,374 of wool, 122,774 of butter, and 11,085 gallons of sorghum molasses. There were 9,009 horses, 2,155 mules and asses, 5,469 milch cows, 11,176 other cattle, 20,580 sheep, and 38,523 swine; 2 flour mills, and 13 saw mills. Capital, Richmond.

RAY, Isaac, an American physician, born in Beverly, Mass., in January, 1807. He graduated at the Harvard medical school, and began the practice of medicine in Portland, Me., in 1827. In 1829 he removed to Eastport, Me., in 1841 was appointed superintendent of the state insane hospital at Augusta, and in 1845 superintendent of the Butler hospital for the insane at Providence, R. I., which office he filled till 1866. He subsequently removed to Philadelphia. He has published "Conversations on Animal Economy" (Portland, 1829); "Medical Jurisprudence of Insanity" (Boston, 1838; 5th ed., enlarged, 1872); "Education in relation to the Health of the Brain" (1851); and "Mental Hygiene" (1863).

RAY, John (or WRAY, as he at one time spelled his name), an English naturalist, born near Braintree, Essex, in 1628, died in 1705. He graduated at Trinity college, Cambridge, became a fellow in 1649, professor of Greek in 1650, and mathematical tutor in 1652. His health being impaired, he travelled over the greater part of England, Wales, and Scotland, studying their botany and zoölogy. At the restoration he took orders, but never held any church preferment, and two years later resigned his fellowship, as he could not conscientiously subscribe to the act of uniformity. After this he resided chiefly at Middleton hall, in Warwickshire. From 1663 to 1666 he travelled with Mr. Willughby on the continent, and he published an account of this tour in 1673. In 1667 he was elected a fellow of the royal society. Among his most important works are: *Catalogus Plantarum Angliæ* (1670), the foundation of all English floras; *Methodus Plantarum Nova* (1682), in which he proposed a new method of classification, which, altered and amended by himself, formed the basis of the method of Jussieu; and *Historia Plantarum* (3 vols., 1686-1704). He edited Willughby's works on the animal king-

dom, and published several of his own. His "Collection of English Proverbs" (1672) has passed through many editions, and was reprinted with additions by H. G. Bohn (London, 1850). A revised edition of his "Glossaries of North and South Country Words," by Skeat, was published in 1874 by the English dialect society. The Ray society of London, formed in 1844 for the publication of works on natural history, took its name from him, and has published "Memorials of John Ray," edited by E. Lankester, M. D. (1844).

RAYER, Pierre François Olive, a French physician, born at St. Sylvain, Normandy, March 8, 1793, died Sept. 10, 1867. He graduated in medicine at Paris in 1818, and soon acquired an extensive reputation both as a scientific man and as a practitioner. In 1832 he was appointed physician-in-chief to the hospital of La Charité, and in 1852 was attached to the medical service of the imperial household. He published *Sommaire d'une histoire abrégée de l'anatomie pathologique* (1818); *Mémoire sur le delirium tremens* (1819); *Histoire de l'épidémie de suette miliaire qui a régné en 1821 dans l'Oise et le Seine-et-Oise* (1822); *De la morve et du farcin chez l'homme* (1837); *Traité théorique et pratique des maladies de la peau* (2 vols., 1826-'7; new ed., 3 vols., 1835); and *Traité des maladies des reins et des altérations de la sécrétion urinaire* (3 vols., 1837-'41). The last two were his most important works.

RAYMOND, Henry Jarvis, an American journalist, born in Lima, Livingston co., N. Y., Jan. 24, 1820, died in New York, June 18, 1869. He worked on his father's farm, at the age of 16 taught a country school, and graduated at the university of Vermont in 1840. He then studied law for a year in New York, and became assistant editor of the "Tribune" on its establishment by Mr. Greeley in 1841, having previously contributed to the "New Yorker," edited by the same journalist. He was remarkably accurate and successful as a reporter, and in 1843 joined the staff of the "Courier and Enquirer," in which journal he had a controversy with Greeley on Fourierism, which was published in a pamphlet. He was elected by the whigs to the state assembly in 1849, was reelected in 1850, and became speaker. In 1851 he severed his connection with the "Courier and Enquirer," and founded (Sept. 18) the "New York Times." In the whig national convention at Baltimore in 1852, in the face of violent opposition, he delivered a long address setting forth the northern views of the public questions then at issue. In 1854 he was elected lieutenant governor of New York. He was prominent in organizing the republican party, and wrote its "Address to the People" issued by the convention at Pittsburgh in February, 1856. He warmly supported the government in the civil war, and in 1864 was elected to congress, where he advocated the reconstruction policy of President Johnson. He published "History of the Administration

of President Lincoln" (12mo, 1864; enlarged, "Life and Public Services of Abraham Lincoln," 8vo, 1865), and numerous addresses.

RAYMOND, John T. See supplement.

RAYMOND, Rossiter Worthington, an American mining engineer, born in Cincinnati, April 27, 1840. He graduated at the Brooklyn polytechnic institute in 1858, and afterward spent three years in study at Heidelberg, Munich, and Freiberg. In 1864 he began practice in New York as a consulting engineer, and he has been since 1867 editor of the "American Journal of Mining" (afterward the "Engineering and Mining Journal"), since 1868 United States commissioner of mining statistics, and since 1870 lecturer on economic geology in Lafayette college, Easton, Pa. He was elected a vice president of the American institute of mining engineers in 1871, and president in 1872, '73, and '74. He has published annual reports of mining statistics from 1869 to 1875 inclusive, several of which have been republished as separate works; "The Children's Week," a volume of short stories (1871); "Brave Hearts," a novel (1873); and "The Man in the Moon and other Stories" (1874).

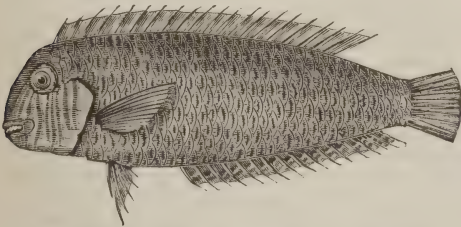
RAYMOND VI., of Toulouse. See ALBIGENSES.

RAYNAL, Guillaume Thomas François, a French historian, born at St. Geniez, Guienne, April 12, 1713, died near Paris, March 6, 1796. He was educated at a college of the Jesuits, became a priest, and for some time taught theology and preached. He went to Paris in 1747, and became an assistant clergyman at the church of St. Sulpice; but he soon gave up the ministry, associated with the "philosophers," and became director of the *Mercur de France*. He published various historical works, and, with the assistance of Diderot and others, prepared anonymously an *Histoire philosophique et politique des établissements et du commerce des Européens dans les deux Indes* (4 vols. 8vo, 1770). A second edition, containing attacks upon religion and government, was interdicted on Dec. 19, 1779; and when it appeared under his name at Geneva (5 vols. 4to, with atlas, 1780), a warrant was issued for his arrest, which he avoided by leaving France, and the parliament ordered his book to be burned by the executioner (May 25, 1781). In the same year he published his *Tableau et révolutions des colonies anglaises dans l'Amérique Septentrionale* (2 vols. 12mo), which was immediately translated into English, and the blunders of which were pointed out in a pamphlet by Thomas Paine. For several years Raynal wandered in foreign countries, and was finally permitted to return home in 1788; in 1790 the sentence of the parliament against his *Histoire philosophique* was reversed. The next year Raynal addressed to the president of the constituent assembly a letter denouncing the disorders committed in France in the name of liberty, and regretting that he "was one of those who, by expressing in their works a generous indignation against arbitrary power, had

been perhaps the means of putting weapons into the hands of licentiousness and tyranny."

RAYNOUARD, François Juste Marie, a French author, born in Brignolles, Provence, Sept. 18, 1761, died at Passy, near Paris, Oct. 27, 1836. Elected an assistant deputy to the convention, he sided with the Girondists, and after their fall was detained in prison till the revolution of Thermidor (July 27, 1794). In 1803 he obtained a prize at the French academy for a poem entitled *La vertu nécessaire dans les républiques*; and in the following year another for his *Socrate dans le temple d'Aglauré*. In 1805 his tragedy *Les templiers* was very successful. He was a member of the corps législatif from 1806 to 1813, and was elected a member of the French academy in 1807. During the hundred days Raynouard was offered the title of councillor of the university and the post of minister of justice, both of which he declined. He published *Choix de poésies originales des troubadours* (6 vols. 8vo, Paris, 1816-'21). His *Lexique roman, ou Dictionnaire de la langue des troubadours, comparée aux autres langues de l'Europe latine*, was posthumously published (6 vols. 8vo, 1838-'44). He was elected perpetual secretary of the French academy in 1817, but declined the usual salary attached to this office. Soon afterward, to save his brother from bankruptcy, he voluntarily gave up all his property.

RAZOR FISH (*xyrichthys*, Val.), an acanthopterygian genus belonging to the family of *cyclo-labridæ*. The body is compressed and covered with large scales, the lateral line interrupted; the profile is almost vertical, the forehead trenchant, and the eyes high up; the sharpness of the head is not owing to the interparietal crest as in *coryphæna* (the dolphin of sailors), but to the ethmoid and intermaxillaries growing directly downward, the lower jaw being



Mediterranean Razor Fish (*Xyrichthys cultratus*).

horizontal and of ordinary length; the cheeks are scaleless, and the snout smooth and blunt; the dorsal is long and of uniform height; the teeth are in one row, conical, largest in the middle; the palate and tongue are smooth, but the pharynx is furnished with small and pavement-like teeth; the intestinal tube is simple, without stomachal dilatation and pancreatic cæca; the air bladder is large, pointed in front. The type of the genus is the razor fish of the Mediterranean (*X. cultratus*, Val.); it is about 8 in. long, reddish, variously striped with blu-

ish; its flesh is highly esteemed as a delicate food; it lives solitary, on sandy bottoms near the shores, feeding on such fish and mollusks as its very small mouth enables it to swallow. About a dozen other species, of the same size, are found in the East and West Indies, among the Pacific islands, and on the coast of South America, where their flesh is eaten; in some the three anterior rays of the dorsal are detached and far forward, forming two dorsals.

RAZOR SHELL (*solen*, Linn.), the type of the lamellibranchiate family of *solenidæ*. The genus is characterized by two adductor muscles, the mantle open anteriorly and produced into two short united siphons, the branchiæ attached to the lower; the foot is long and club-shaped; the shells are elongated, equivalve, and gaping at both ends; the hinge has two or three compressed teeth in each valve, and is nearly terminal; the ligament is long and external. The common razor shell of our



Common Razor Shell (*Solen ensis*).

coast is the *S. ensis* (Linn.), of a scabbard shape, about 6 in. long and an inch high, with rounded ends, white within and covered outside by a glossy yellowish or brownish green epidermis. It is found on sandy beaches near low-water mark, where it burrows beneath the surface, whence it is sometimes displaced by storms; it descends into the sand with astonishing rapidity; the animal is cylindrical, longer than the shell, and is often used as food under the names of long claw, knife handle, and razor fish. The *S. siliqua* and *S. curtus* of Europe have similar habits, sinking vertically in the sand, foot downward; their burrows are sometimes 2 ft. deep, and they ascend and descend in them very quickly by widening or narrowing the foot. They are used as food, and as bait for cod and haddock; their burrows may be known by small orifices like keyholes, into which the fishermen put a little salt; this so irritates the tubes that the animal ascends near the surface, and is dragged out with an iron hook. They are found in almost all seas.

RAZZI, Giovanni Antonio, called IL SODOMA, an Italian painter, born in Vercelli, Piedmont, about 1479, died in Siena, Feb. 14, 1554. He formed his style on that of Leonardo da Vinci, and was early employed by Pope Julius II. to execute a series of works in the Vatican, afterward in part obliterated to make room for frescoes of Raphael. In the Chigi palace, now Farnesina, he painted in fresco the "Marriage of Alexander and Roxana" and the "Family of Darius." His best works are at Siena, including the "Adoration of the Magi" in the church of S. Agostino, and the "Flagellation" in the convent of S. Francisco.

RÉ, or **Rhé**, an island of France, in the bay of Biscay, forming part of the department of Charente-Inférieure, and separated from La Rochelle by a channel about 2 m. wide; area, about 30 sq. m.; pop. about 18,000. The island is inaccessible on the S. W., but the N. E. coast is strongly indented and forms several harbors. The inhabitants are engaged in commerce and the fisheries, the production of salt, and the manufacture of wine, brandy, and vinegar. The chief town, St. Martin de Ré, on the N. E. coast (pop. in 1872, 2,740), is strongly fortified. From its commanding position near La Rochelle, the isle of Ré was of great military importance in Richelieu's final struggle with the Huguenots. In 1627 the duke of Buckingham led a powerful expedition against it. He landed on July 20, and continued the attack for more than three months, but was finally forced to abandon it.

REACH, **Angus Bethune**, a British author, born in Inverness, Scotland, Jan. 23, 1821, died Nov. 25, 1856. He became about 1850 a reporter on the staff of the London "Morning Chronicle," composed much for the stage, and published "Claret and Olives: from the Garonne to the Rhône" (1852); two romances, "Clement Lorimer" (1849), and "Leonard Lindsay," a story of a buccaneer (1850); "Men of the Hour, in three Parts: Bores, Tuft Hunters, the Bal Masqué" (1856), &c.

READ, **George**, a signer of the Declaration of Independence, born in Cecil co., Md., Sept. 18, 1733, died in New Castle, Del., Sept. 21, 1798. He studied law at Philadelphia, was admitted to the bar at the age of 19, began practice at New Castle, and in 1763 was appointed attorney general for the three lower counties on the Delaware, the designation by which the present state of Delaware was then known. In 1774 he was elected to congress, of which he continued to be a member, with a brief interval, till near the close of the revolution. When the question of independence was first agitated, Mr. Read opposed it as premature, but was afterward among its most zealous supporters. In 1776 he was president of the convention that formed the first constitution of Delaware, of which he was the author, and under which he was chosen vice president, and served for a short time as president during the captivity of the regular incumbent. In 1782 he was made judge of the United States court of appeals in admiralty cases. He represented Delaware in the convention that framed the constitution of the United States, was the first senator chosen under it for that state, and retained his seat till 1793, when he was made chief justice of Delaware.

READ, **Nathan**, an American inventor, born at Warren, Worcester co., Mass., July 2, 1759, died near Belfast, Me., Jan. 20, 1849. He graduated at Harvard college in 1781, and was tutor there for four years. In 1796 he established, with others, the Salem iron foundry,

and invented a machine, patented in January, 1798, for cutting and heading nails at one operation. From 1800 to 1803 he was a member of congress. In 1807 he removed to Belfast, Me., and for many years was chief justice in the court of Hancock co. He was the author of many inventions, was one of the first to experiment with steam for navigation, and invented multitubular boilers and high-pressure engines. He also invented a method of equalizing the action of windmills, by accumulating the force of the wind by winding up a weight; a plan of using the force of the tide by means of reservoirs alternately filled and emptied in such a way as to produce a constant stream; different forms of pumping engines and threshing machines; and a plan for using the expansion and contraction of metals, multiplied by levers, for winding up clocks and other purposes. He was a member of the academy of arts and sciences.—See "Nathan Read, his Inventions," &c., by his nephew David Read (1870).

READ, **Thomas Buchanan**, an American artist and poet, born in Chester co., Pa., March 12, 1822, died in New York, May 11, 1872. At the age of 17 he entered the studio of a sculptor in Cincinnati. In 1841 he removed to New York, and after a few months to Boston, where he began his career as a painter. He contributed poems to the Boston "Courier" in 1843 and 1844, and in 1846 settled in Philadelphia. In 1850 he went to Florence, and with occasional visits to America resided in Italy till the spring of 1872, when he returned to America, but died soon after his arrival. His most popular pictures are portraits. He published "Lays and Ballads" (Philadelphia, 1848); "The New Pastoral" (1855); "The House by the Sea" (1856); "The Wagoner of the Alleghanies" (1862); "A Summer Story, and other Poems" (1865); and "Poetical Works" (3 vols., Philadelphia, 1866).

READE, **J. Charles**, an English novelist, born at Ipsden, Oxfordshire, in 1814. He graduated in 1835 at Magdalen college, Oxford, where he was elected to one of the Vinerian fellowships in 1842. In 1843 he was called to the bar by the society of Lincoln's Inn, but soon after gave his attention wholly to literature. In 1847 he received the degree of D. C. L. from his university. Among his earliest literary efforts was a drama in five acts, entitled "Gold," which appeared in 1850. In 1852 he published his first story, "Peg Woffington," which immediately gave him rank as a writer of fiction, and in the following year "Christie Johnstone," which met with still greater favor. These stories are simple in plot and unpretentious in design, but are full of dramatic force, rich in incident, and marked by a peculiar tenderness and pathos. In 1854, in conjunction with Mr. Tom Taylor, he published a volume of plays, containing "Masks and Faces," the plot of which is identical with that of "Peg Woffington," "Two Loves and a Life,"

and "The King's Rival." "Clouds and Sunshine" and "Art, a Dramatic Tale," two novellettes, appeared in 1855. All these works were received with a flattering welcome, and in 1856 he published a more ambitious novel, entitled "It is Never too Late to Mend," in which he aimed to show the possibility of the reformation of a criminal. This, which was the first of a series of romances, each written to illustrate some social or public wrong, aroused attention to the brutalities of the English prison system, and was instrumental in effecting their amelioration. His later works are: "The Double Marriage, or White Lies," "The Course of True Love never did run Smooth," "Propria Quæ Maribus, and the Box Tunnel" (1857); "Cream: Jack of all Trades," and the "Autobiography of a Thief" (1858); "Love me Little, Love me Long," and "A Good Fight and other Tales" (1859); "The Eighth Commandment" (1860); "The Cloister and the Hearth, or Maid, Wife, and Widow" (1861); "Hard Cash" (1863); "Griffith Gaunt, or Jealousy" (1866); "Foul Play," in connection with Dion Boucicault (1868); "Put Yourself in his Place" (1870); "A Terrible Temptation" (1871); "The Wandering Heir" (1872); "A Simpleton: a Story of a Day" (1874); and "A Hero and a Martyr" (1875). Of these, "The Cloister and the Hearth" incorporates the greater part of a previous story, "A Good Fight," but the plot soon changes and justifies the secondary title of "Maid, Wife, and Widow." The chief characters, Gerard and Margaret, are the parents of Erasmus. "Hard Cash" was written with the object of calling attention to the abuses of lunatic asylums; and so forcibly did he put the facts which he had gathered that it awakened official investigation and led to a change in the English lunacy laws. "Put Yourself in his Place" is an exposure of the system of terrorism, vulgarly called "rattening," practised by the trades unions in English manufacturing towns for the intimidation of independent workmen. Many of Mr. Reade's stories have been successfully dramatized, and nearly all of them have been translated into the different languages of Europe. Mr. Reade's style is characterized by great terseness and vigor, and by a wealth of incident which few writers of fiction have possessed; and though marred by occasional peculiarities, which in some instances degenerate into literary trickery, it has won him great popularity and a place among the foremost novelists of the age. **II. William Winwood**, an English traveller, nephew of the preceding, born at Ipsden, Oxfordshire, in 1839, died at Wimbledon, April 24, 1875. He visited the west coast of Africa first in 1862-'3, and on his return published "Savage Africa: a Narrative of a Tour in Equatorial, Southwestern, and Northwestern Africa" (1863). In 1868-'70 he again visited the west coast, penetrated inland by a new route from Sierra Leone to the source of the Niger, established friendly relations be-

tween that colony and the native powers 450 m. from the coast, and proved that the Niger has its rise in the same range of mountains as the Senegal and the Gambia. (See NIGER.) He soon after published "The Martyrdom of Man" (1872) and "The African Sketch Book" (1873). In 1873-'4 he accompanied the Ashantee expedition as special correspondent of the London "Times," and incurred the disease which resulted in his death. His "Story of the Ashantee Campaign" was published in 1875. Mr. Reade was also the author of several novels: "Charlotte and Myra" and "Liberty Hall, Oxon." (1859); "The Veil of Isis, or the Mysteries of the Druids" (1861); "See-Saw, by Francesco Abati, edited by W. W. Reade" (1865); and "The Outcast" (1875).

READING, a city and the capital of Berks co., Pennsylvania, on the E. bank of the Schuylkill river, here crossed by three bridges, and on the Schuylkill and Union canals, at the intersection of several branches of the Philadelphia and Reading railroad with the Wilmington and Reading line, 54 m. E. of Harrisburg and 58 m. N. W. of Philadelphia; pop. in 1800, 2,385; in 1810, 3,463; in 1820, 4,352; in 1830, 5,859; in 1840, 8,410; in 1850, 15,743; in 1860, 23,162; in 1870, 33,930, of whom 3,871 were foreigners. It is very pleasantly situated on an elevated and ascending plain, backed on the east by Penn's Mount, and on the south by the Neversink mountain, from both of which flow streams of pure water, abundantly supplying the city. It is regularly laid out, well built, and kept neat and cleanly. The streets cross each other at right angles, and in the centre is a square on which are the chief hotels and stores. The court house is a very handsome edifice with a fine portico, sustained by six columns of red sandstone. Other public buildings are the city hall, county jail, opera house, and academy of music. Of the churches the most conspicuous are Trinity (German Lutheran), an antique building with a spire 210 ft. high, and Christ (Episcopal), an imposing Gothic edifice of red sandstone with a spire 202 ft. high. Reading is surrounded by a rich farming country, with which it has a very important trade. The inhabitants of this district are chiefly of German origin, and a dialect of German, known as Pennsylvania Dutch, prevails extensively among them. The city is especially noted for its manufactures, among which the production and working of iron hold the first rank. Much of the ore is obtained from Penn's Mount. The chief establishments are 6 furnaces, 2 forges, 7 founderies, 5 rolling mills, a nail factory, 15 machine shops, 3 manufactories of iron ware of various sorts, 3 of steam boilers, 2 of nuts and bolts, and 3 of iron pipe. There are also a cotton mill, 13 shoe factories, 8 tanneries, 6 breweries, 9 brick factories, 9 manufactories of furniture, 80 of cigars, one of spokes, one of rope, one of carpets, one of spectacles, 10 of wool hats, 6 of cooperage, 2 distilleries, 3 paper mills, and 5

planing mills. The shops of the Philadelphia and Reading railroad employ 2,800 men. Reading contains three national banks with an aggregate capital of \$700,000, a savings bank with \$100,000 capital, and four fire insurance companies. It is divided into nine wards, and is governed by a mayor, a select council of nine members (one from each ward), and a common council of 28. There are an efficient fire department and a police force. The principal charitable associations are a dispensary and a female orphan asylum. The public schools and departments comprise 1 normal school, 1 high school, 11 grammar, 18 secondary, and 33 primary departments, and 1 colored school. The number of teachers in 1874 was 121; pupils enrolled, 6,457; average attendance, 5,326. The Reading library contains 3,000 volumes. Three daily (one German) and eight weekly (six German) newspapers, and one semi-monthly (German) periodical are published. There are 31 churches, viz.: 2 Baptist, 1 Church of God, 2 Episcopal, 3 Evangelical Association, 1 Friends', 5 Lutheran, 4 Methodist, 3 Presbyterian, 5 Reformed, 2 Roman Catholic, 1 United Brethren, 1 United Brethren in Christ, and 1 Universalist.—Reading was laid out in 1748. It was incorporated as a borough in 1783, and as a city in 1847.

READING, a borough of England, county town of Berkshire, on the Kennet, near its junction with the Thames, 39 m. W. by S. of London; pop. in 1871, 32,324. It has greatly improved within the past 20 years, and is now an important centre of railways and of trade. There are several fine churches. A working men's hall was opened in 1862, the town hall was enlarged in 1863, and the elegant station of the Great Western railway was completed in 1868. Flour and grain are largely exported to London. Silk and agricultural implements are manufactured, and there are iron foundries, breweries, and extensive biscuit bakeries.—Reading is very ancient, has returned two members to parliament since the time of Edward I., and has been the scene of important historical events.

REALTY (law Lat. *realitas*, from *res*, a thing), in law, property in lands, tenements, and hereditaments. The common law of real property is distinctively and almost entirely English, founded on the rules and customs which in the feudal period governed the tenure of lands. It is the theory of the English law that no occupant of lands, not even a freeholder, has absolute ownership of them; he has only an estate. The king is lord paramount, and all the land in the realm is holden mediately or immediately of him. The chief estates in lands of the present time originated no doubt in the various forms of feudal tenure. Life feuds were probably earlier than feuds of inheritance; for as feuds were granted in consideration of a return of military services, and as this consideration was to be furnished by a certain individual whose already known valor or fidelity

induced the gift, lands were without doubt primarily limited to the first donee; that is to say, they could neither be aliened by him to a stranger nor transmitted to his heirs. But as the lords became strong in their possessions, or when the times were more secure, it became safe and possible to grant estates of inheritance in feuds; namely, to the first taker and certain of his heirs or to his heirs in general. From these modes of tenure came the modern estates respectively, for life, in tail, and in fee. Each of these is a freehold and a real interest, but no estate less than one for life (and a lease to A for 1,000 years is, in the contemplation of the law, a smaller interest than a grant for the term of his life) is a freehold or an estate in realty. But besides lands, things real, as the tautological phrase of the law is, comprise also tenements and hereditaments; and these are embraced in this term, because they possess some of the characteristic qualities of lands, as they may be holden on tenure or are inheritable. These terms may include things incorporate. Land includes only tangible or corporeal property: the ground or soil, and everything which is attached to it naturally, as trees, stones, or herbage, or by art, as houses or other structures. Growing timber, therefore, and standing grass or grain, so long as they are rooted in and supported by the soil, are parts of the realty, though they become personalty immediately on severance. But when corn or any other annual product of the soil is ripe and fit to be gathered, though not yet severed, it is personal property. A permanent building erected on one's land becomes his property, even though the materials for it were wrongfully taken from another. But a building erected on another's land, by his permission, may remain the personal property of the builder. (See **FIXTURE**.)—Besides the incidents and elements of land which we have already mentioned, and which are examples of corporeal hereditament, there may be also incorporeal hereditaments, that is, rights annexed to and issuing out of lands, as rights of common and of way, easements, and rents. These rank next in dignity and extent to lands. (See **COMMON**, **RIGHTS OF**, **EASEMENT**, **LEASE**, and **LICENSE**.) A right of way is the right of passage over another man's ground. It may be founded in an actual grant by the owner of the soil, or may be claimed by prescription, which supposes a grant, or it may arise immediately from necessity; as where one sells a lot surrounded by other land of his, here, as a right of passage is necessary to the enjoyment of the lot granted, the grantor is conclusively presumed to have granted it to the purchaser. If the way thus granted and ordinarily used become impassable, it seems just that the purchaser shall have the right, founded on the same presumption, of passing over the adjacent lands of the grantor. Not so, however, if the way be a private one, lying in actual grant, for here the grantor presumptively bound himself to repair. The right

of the public in the highway is, ordinarily, only an easement. The fee in the soil belongs to the abutters, and the complete use of the ground returns to them whenever it becomes discharged of the easement. The road bed of railways is generally subject to the same rules. The right of soil in land bounded by navigable rivers where the tide ebbs and flows, belongs to the owner of the land as far as low-water mark. The right to navigate such waters belongs, in all states of the tide, to the public. Grants upon streams above the flow of the tide convey not only the banks but the beds of the streams and the islands in them to the middle line of the water (*ad filum medium aquæ*). But the right of the grantee is qualified by the right of the public to use the stream as a highway if it be navigable.

REAPING MACHINES. See **MOWING AND REAPING MACHINES.**

RÉAUMUR, René Antoine Ferchault de, a French natural philosopher, born in La Rochelle, Feb. 28, 1683, died Oct. 18, 1757. He studied law at Bourges, but went to Paris in 1703, gained distinction by his philosophical researches, and in 1708 was admitted to the academy of sciences. In his *L'Art de convertir le fer forgé en acier, et l'art d'adoucir le fer fondu* (1722), he first made known in France the process of manufacturing steel. For this he received a pension of 12,000 livres, which he applied to the encouragement of the industrial arts. He invented a process for tinning iron, and made experiments in the manufacture of porcelain; an opaque white glass which he made is known as "Réaumur's porcelain." He also discovered the means of preserving eggs, and made experiments in artificial incubation. In 1731 he invented the thermometer which is called after him, and is still largely used in Germany and other parts of the European continent, taking as the extremes the freezing and boiling points of water, and dividing the interval into 80 degrees. He investigated many curious topics in natural history, especially the mode of formation and growth of the scales of fishes, the development of the shells of testaceous animals, the reproduction of the claws of lobsters and crabs, and the mode of motion of star fishes and various mollusks and zoöphytes. He discovered a species of mollusk that furnishes a purple dye nearly equal to that used by the ancients. His most thorough investigations were in the department of entomology, to which he devoted several years. He published *Mémoires pour servir à l'histoire naturelle des insectes* (6 vols. 4to, 1734-42), and a variety of papers in the transactions of the academy of sciences.

REBEKAH. See **ISAAC**, and **JACOB**.

REBOLLEDO, Bernardino, count de, a Spanish author, born in Leon in 1597, died in Madrid in 1676. He served in Italy and against the Turks, took part in the thirty years' war, was created by Ferdinand II. a count of the German empire, and received the government of

the Lower Palatinate. He was several years ambassador to Denmark, and from 1662 till his death was president of the board of war at Madrid. He wrote *Ocios* ("Leisure Hours," Antwerp, 1650); *Selas militares y politicas*, poems on the arts of war and civil government (Copenhagen, 1652); *Selas dñicas* (4to, 1665), a compendium in verse of the history and geography of Denmark; and some minor writings. The best edition of his works is that of Madrid (4 vols. 8vo, 1778).

RÉCAMIER, Jeanne Françoise Julie Adelaïde, a French leader of society, born in Lyons, Dec. 4, 1777, died in Paris, May 11, 1849. Her father was M. Bernard, a banker, connected with the postal service; his receptions were attended by distinguished people, who greatly admired her extraordinary beauty, modesty, and accomplishments. In 1793 she married M. Récamier, a rich banker of middle age, for whom she felt only respect. He purchased in 1798 the hôtel Necker, which led to her lifelong intimacy with Mme. de Staël. This displeased Napoleon, and she gave him further offence by declining in 1803 to become a lady attendant on the empress Josephine. The bankruptcy of her husband made her in 1804 accept the hospitality of Mme. de Staël at Coppet, where she met Prince Augustus of Prussia. She had accepted with indifference the homage, though not the friendship, of the brothers Montmorency, Lucien Bonaparte, Benjamin Constant, and other celebrities; the only man whose affection she seems to have returned was the Prussian prince, but she refrained from urging a divorce to enable her to accept his proposal of marriage. Napoleon objecting in 1811 to her residing in Paris, she spent some years in Burgundy, Lyons, and Italy. Her patriotism remained, however, unabated, and when in 1815 the duke of Wellington paid his respects to her and exulted over Waterloo, she forbade him her house. New reverses obliged her to occupy modest apartments in the abbaye aux Bois, formerly a convent, in the faubourg St. Germain. In 1817, at the death of Mme. de Staël, she first met Chateaubriand, in whose enthusiastic admiration she took great pride. His wife dying in 1846, he offered to marry Mme. Récamier, whose husband had died in 1830; she declined, but he remained to the last her faithful friend and correspondent. (See Chateaubriand's *Mémoires d'outre tombe*.) Her partiality for royalists and for ultramontane writers of the romantic school, and the occasionally intolerant character of her brilliant receptions, did not escape criticism amid the general admiration which she inspired to the last.—See *Souvenirs et correspondance tirés des papiers de Madame Récamier*, edited by her niece and adopted daughter, Mme. Lenormant (2 vols., Paris, 3d ed., 1860; English translation by Isaphene M. Luyster, Boston, 1867), and *Madame Récamier, les amis de sa jeunesse*, by the same (1872; English translation by I. M. Luyster, Boston, 1875).

RECIFE, or **Pernambuco**, a maritime city of Brazil, capital of the province of Pernambuco, 1,150 m. N. E. of Rio de Janeiro; lat. $8^{\circ} 4' S.$, lon. $34^{\circ} 50' W.$; pop. about 100,000. It is at the common mouth of the rivers Beberibe and Capibaribe, which form a delta comprising several islands, and is divided into three quarters, Boa Vista, São Antonio, and Recife proper, united by bridges. Many of the streets are regular, particularly in Boa Vista, well paved, and lighted with gas; and the houses are partly of brick, with three and four stories. Besides handsome parish churches, there are several others, mostly attached to convents; the remaining edifices of note are the governor's and bishop's palaces, the city hall and provincial government buildings, the arsenal, custom house, lazaretto and other hospitals, and benevolent institutions. There are a lyceum, a law school, and a provincial gymnasium. The port, defended by several forts, is protected by a reef (whence the name Recife), to which masonry has been added. A breach in the reef forms the entrance to the river port, which, though very commodious, is inaccessible to craft of over 700 tons, owing to a sand bank. Recife has three banks, flourishing tobacco, soap, and paper factories, and two machine shops. The total value of the exports in the year 1872-'3 was \$12,808,788, the staples being cotton, sugar, molasses, rum, and hides. The Pernambuco and São Francisco railway extends S. E. from the city. The town is the western terminus of the submarine cable from Lisbon, completed in June, 1874. It was founded about 1530, by Duarte Coelho, and erected into a bishopric in 1676. The English occupied it in 1595; it was seized by the Dutch in 1629; and it has repeatedly been the scene of insurrections, particularly in 1661 and 1710.

RECITATIVE (Lat. *recitare*, to recite; called by the Italians *musica parlante*, speaking music), a species of artificial declamation adapted to musical notes, imitating the inflections of natural speech, and forming a medium between ordinary recitation or speaking, which it nearly resembles, and measured air or song. It was first introduced at Rome by Emilio del Cavaliere in 1600, and is now a recognized and indeed an essential form of vocal composition in the grand Italian opera, oratorios, and cantatas, serving to express some action or passion, to relate a story, or to connect scenes and situations, without injuring the effect of the performance by resorting to spoken words. Although written in common time, the recitative may be delivered by the singer according to his fancy, subject of course to the laws of prosody, the lengths of the notes as given by the composer being mere approximations. The accompaniment generally consists of a few occasional chords struck by the pianoforte to indicate the harmony, although sometimes the violoncellos take the chords in *arpeggio*. This, the simplest form of recitative, is called *reci-*

tativo secco; when besides the bass the recitative is accompanied by other instruments of the orchestra, it is *recitativo instrumentato*; when interrupted by interjected passages performed by the orchestra, it is said to be *obbligato*. The more modern composers have given great attention to elaborating the recitative, Wagner having gone so far as to banish the *aria* and substitute in its place a kind of musical recitation, between recitative and song.

RECLUS, Jean Jacques Elisée, a French geographer, born at Ste. Foy la Grande, department of Gironde, March 15, 1830. He studied under Carl Ritter in Berlin, and travelled in Great Britain and North and South America from 1851 to 1857, when he returned to France and published a series of books of travel. For continuing to serve in the national guard of Paris after the establishment of the commune he was sentenced to death (1871); but the sentence was commuted to banishment, and he was finally pardoned. His principal works are: *La terre* (2 vols., 1867-'8; English translation, "The Earth," edited by B. B. Woodward, 2 vols., New York, 1871); *Les phénomènes terrestres, les mers et les météores* (1872; English translation, "The Ocean, Atmosphere, and Life," by B. B. Woodward, edited by Henry Woodward, New York, 1872); *Voyage aux régions minières de la Transylvanie occidentale* (1873); and *Nouvelle géographie universelle* (part i., 1875).

RECOGNIZANCE (law Fr. *reconnaissance*; law Lat. *recognitio*), an obligation of record entered into before a court of record or magistrate duly authorized to take it, with condition to perform some specified act; as to appear at the assizes or criminal court, to keep the peace, to pay a debt, or some other thing of a like description, upon the performance of which condition the obligation is to become null and void. The state or person in whose favor or to whom the recognizance is made is called the cognizee, and the person who enters into it the cognizor. The word recognizance is given to this kind of obligation, because, generally, the form of it is this: the clerk or other proper officer says to the cognizor: "You acknowledge yourself bound to," &c.; to which the cognizor assents; and it is then made matter of record.—Recognizances are of several kinds and descriptions, and are used for various purposes both civil and criminal. Of the former kind was a recognizance of debt at common law, in the nature of a deed to charge or encumber lands. This was very similar in form and effect to an ordinary bond, the main distinction being that while a bond is the creation of a fresh debt or obligation, a recognizance was the acknowledgment of a debt already existing upon record. It was certified to or taken by the officer of some court, and witnessed only by the record of such court, instead of having the cognizor's seal affixed to it. It was not strictly a deed, though in effect it was of greater force and obligation, and was

allowed a priority of payment, and bound the lands of the cognizor from the time of its enrolment on record. It operated as a lien upon all the lands which the cognizor possessed at the time he acknowledged it, and also upon all those which he afterward acquired, so that no alienation of them made by him while his recognizance remained in force would defeat the claim of the cognizee or prevent his extending such lands. Recognizances for debt may still be taken in this country under statutory provisions, but they operate merely as evidences of debt in the nature of a judgment, upon which execution may issue, and do not generally create a lien upon the cognizor's land or other property.—There were also, at common law, two other recognizances of a private sort, said to be in the nature of a statute staple and a statute merchant. The undertaking of special bail in a civil action, of which the bail piece (a slip of parchment so called, on which it was transmitted to court) was a memorandum, was a recognizance entered into by the cognizors before the court or judge for a sum equal (or in some cases double) to that which the plaintiff had sworn to, by which they undertook that if the defendant was condemned in the action he should pay the costs and condemnation, or render himself a prisoner, or that they would pay it for him.—In criminal practice recognizances are used both as a means of securing the proper administration of justice by compelling the appearance of a party accused before a magistrate for further examination, or for trial at some superior court, and of securing the attendance of witnesses by binding them, with sufficient sureties, to appear and testify. They are used also as a means of preventing the commission of crimes, by obliging the persons suspected of an intent to commit them to recognize in some penal sum, with pledges or sureties, to keep the peace and be of good behavior for a certain time. A recognizance to keep the peace may be taken by any justice of the peace, from any one who creates an affray or disturbance in his presence, or goes about with unusual attendance or weapons to the terror of the people, or is brought before him by a constable for a breach of the peace; and he is bound to grant it in favor of any person who can show just cause to believe that he is in danger of bodily harm at the hands of another. A recognizance for this purpose is an obligation in the nature of a bond with one or more sureties, entered of record, with condition that if its requirements are fulfilled and the cognizor keeps the peace for the time therein specified, it shall be void and of no effect. If on the contrary it is broken by any breach of the peace, it becomes forfeited or an absolute debt, and the cognizor and his sureties may be sued for the sums in which they are respectively bound. If it is a special recognizance, as to keep the peace toward any particular person, it may be forfeited by any actual violence, or

even an assault or menace, to such person, and to such person only. If it is a general recognizance, it is forfeited by any act which tends to break the peace, done to any person or thing in general.—A recognizance may be discharged by the death of the principal party bound thereby, or by the order of the court to which it is certified by the justice, if they see sufficient cause. If granted upon private account, it may be discharged if the person at whose request it was granted will consent to release it, or does not make his appearance to pray that it may be continued.—At the common law a peer or peeress could not be bound to recognize in any other place than the court of king's bench or chancery; but a justice of the peace had power to require sureties from any person, not a lunatic and under the degree of nobility, whether such person were a fellow justice or other magistrate or merely a private man. Wives may demand it against their husbands, and husbands, if necessary, against their wives; but at common law married women and infants should find security by their friends, because they are incapable of engaging themselves to answer any debt. Some exceptions are made by statute, and the sweeping enlargement of the legal capacities of married women by the legislation of some states has probably removed this disability.—In old practice the verdict of an assize, or strictly the act of the jury in inquiring into the case in order to make up their verdict, was called a recognizance.

RECOLLECTS. See FRANCISCANS.

RECORD (Lat. *recordari*, Fr. *recorder*, to remember). **1.** An official contemporaneous memorandum in writing, drawn up by the proper officer of a court of justice, and containing a summary statement of the proceedings in an action at law brought before that court. This statement comprises a short history of the case and the proceedings consequent thereon; as the nature of the action, the names of the parties and the time of their appearance in court, and the acts of the court itself during the progress of the pleadings, arranged in the order of their occurrence, and sometimes connected by peculiar entries called continuances, the whole concluding with the judgment of the court with respect to the question at issue. These continuances were adjournments of the case from one day or term to another, which the law allowed for certain purposes, and which were entered with the pleadings and other proceedings on the roll or record, and gave the whole a complete and connected form. These records were always written upon rolls of parchment, which indeed was an essential characteristic of a record. In the United States paper is universally used as a substitute for parchment, and the roll form has consequently been abolished, but otherwise the forms of the English records have been generally adopted. Records in this technical sense are peculiar to the common law; and as they form the only strict and proper proof of the pro-

ceedings of the courts in which they are preserved, they are regarded with particular consideration, and are generally a proof of such a high and absolute nature as to admit of no contradiction. In Sir Edward Coke's words, they "import in themselves such uncontrollable credit and verity, as they admit of no averment, plea, or proof to the contrary." The existence of a record can only be tried by itself; that is, if in any action the existence of any matter on record is alleged, and the adverse party pleads *nul tiel record*, or that there is no such record, the issue arising thereon is determined merely by the inspection of the record itself by the court, without witnesses or jury, because no issue can be joined upon it to be tried by a jury as upon matters of fact; and the record is conclusive proof without further evidence. The peculiar privilege of some courts to have these memorials has of itself created the great leading distinction, equally recognized in English and American law, between courts of record and courts not of record. Though courts not of record may keep minutes or memorials of their proceedings, such minutes are not properly records. Legally, the term records applies to the rolls of such only as are courts of record, and not to the rolls of inferior or any other courts which proceed not *secundum legem et consuetudinem Angliæ*, or according to the laws and customs of England. During that term of the court in which any judicial act is to be done, or before the case pending is concluded, the record is said to remain in the breast of the judges of the court, and in their remembrance, and therefore it may be altered during that term in such manner as the judges shall direct. But as soon as that term is ended the record is closed, and it is then said to admit of no change, alteration, or proof to the contrary. But some courts claim and exercise the right to make amendments therein whenever the record is found not to conform to the facts.—The practice of recording is said to be of Norman origin. It existed in the French law, generally, as early as the time of the conquest, if not earlier, and in the same form as that which it bore in Normandy. In the *Assises de Jérusalem*, which was a code of feudal jurisprudence compiled as early as 1099, and intended for the kingdom of Jerusalem then newly established, litigants were directed to collect as many of their own friends as possible in court, and request them to attend to what was said, so that they might retain and record it properly at the time of judgment or trial. They were further directed, if there should be an adjournment or further day appointed for the hearing, that both plaintiff and defendant should put down in writing the nature of the claim and other particulars, in order that they might testify to them at the adjourned meeting if necessary, and thereby assist or confirm the recollection of the judges. This practice finally became developed, from the mere private memoranda of the pleaders, into an official

contemporaneous minute of the proceedings. "Whether this change," says Mr. Stephens, "had fully taken place at the date of Glanvil's treatise (in the reign of Henry II.), that work does not enable us accurately to decide. However, we find, at least very shortly after that period, the practice of recording, in the present sense of the term, was in full operation." Next to Domesday Book, which, though not a legislative record, has all the validity of one, is the "Exchequer Register" (Pipe Roll) of 31 Henry I. The series of legal records in the court of king's bench, now extant, reach from the reign of Richard I. to the present day. The peculiar construction of the record, showing as it did every proceeding in the action precisely as it took place, gave it at a very early period the highest authority as a judicial memorial; and its importance in this particular led to a suitable degree of care in framing and preserving it. Its language gradually reached the highest degree of precision and uniformity, and the whole instrument settled at last into a fixed form of expression, which neither admitted of nor required any variation. When written pleadings took the place of oral, they were framed in the same manner as they had previously appeared on the record, and were in fact simply extracts from it, the same concise and technical forms of expression being always used. From this arose a leading principle of practice, viz., that every proceeding in an action intended or required to appear on the record, must be framed in the language of the record, and with the same exactness as the record itself. Two other circumstances united to give the record the unchangeable character which has accompanied it down to modern times, and almost to the present day. One was, that it was kept in Latin, a language which admitted of no variation; and the other was its inviolable character, which preserved it from the slightest alteration after being once made up. The substitution of the English for the Latin language, and of ordinary writing for the "ancient and immutable court hand," took place in the reign of George II., and was considered by competent judges of that time as a dangerous innovation. It has been certainly followed by other important alterations and modifications, which have greatly impaired the original character of the record as a complete and immutable memorial of all the proceedings in an action. The old continuances and the formal commencements and conclusions of the pleadings are now omitted, the language of the pleadings themselves is greatly modified, and the present tendency undoubtedly is to deprive the record in a great measure of the high dignity and importance which it anciently possessed. II. Record, as the title, or rather evidence of title to real estate, by the record or register of title deeds, is of American origin. The usage has prevailed from the early settlement of New England, and is now universal throughout the United States. By the laws of Massachusetts in 1641

all deeds of conveyance, whether absolute or conditional, were required to be recorded, that "neither creditors might be defrauded nor courts troubled with vexatious suits and endless contentions." The statutes of the various states differ in some immaterial respects as to the time and manner of registry, and as to what deeds or instruments must be recorded; but the principle in all is the same, and all make such record absolutely necessary in order to complete the purchaser's title, and render it valid against creditors and subsequent *bona fide* purchasers. If the deed is not recorded, the sale is nevertheless good and the title passes as between the immediate parties and their heirs and devisees, but it is void as against subsequent *bona fide* purchasers and mortgagees whose deeds are first recorded. In some of the states a specified time is allowed in which the deed may be recorded, but in general the grantee is left to put his conveyance on record whenever he sees fit, the risk of delay being that his title may be lost by another conveyance from his grantor to a *bona fide* purchaser. In 1880 the real property commissioners in England recommended the establishment in that country of a general registry of deeds and instruments relating to land, as contributing to the security of title and the cheapness and facility of transfers of land, and in 1862 such a registry was provided for; but hitherto it has not come into general use. Heritable but not leasehold property is recorded in Scotland in a public register, and the deed must be recorded within 60 days to render it valid against creditors and purchasers. A very simple system for the registration of land titles prevails in Australia, corresponding to the registration of vessels.—It has sometimes been a question whether notice of the transfer of property to a subsequent purchaser was equivalent to a record of the prior deed, and whether the deed of a subsequent purchaser with such notice, duly recorded, would be valid against the prior unrecorded conveyance. The record of a title deed is not considered as conferring title in itself, but merely as evidence of notice or as constructive notice to the public of the title passed by the deed of conveyance of which it is an official and certified copy; and it is therefore a general rule that notice, actual or implied, to a subsequent purchaser of a prior conveyance, is as effectual to defeat his claim as a *bona fide* purchaser as a due record of such conveyance would be; for so long as he receives notice of the prior encumbrance, it makes no difference whether such notice is derived from a record or from any other authentic source, and he purchases thereafter at his peril. In other words, if he knows that the land he buys has already been conveyed to another person who has neglected to record the deed, he cannot claim the rights of a *bona fide* purchaser.

RECORDE, Robert, an English mathematician, born at Tenby, Pembrokeshire, about 1500,

died in London in 1558. He entered Oxford university in 1525, was elected a fellow of All Souls' college in 1531, and taught rhetoric, mathematics, music, and anatomy. In 1545 he received the degree of M. D. from Cambridge university, removed to London, and was physician to Edward VI. and to Queen Mary. He died a prisoner in the king's bench, probably for debt, though he left some property. He wrote the "Gate of Knowledge" and the "Treasury of Knowledge," both of which are lost. His extant works are: "The Ground of Artes, teaching the Woorke and Practice of Arithmetike" (1540), his most popular work; "The Vrial of Physick" (1548); "The Pathway to Knowledge" (1551), a compendium of geometry; "The Castle of Knowledge" (1556); and "The Whetstone of Witte," a mathematical work (1557).

RECORDER, an obsolete wind instrument, resembling the flageolet, though by some writers it has been confounded with the flute. It is said to have had six vents. Its tone was soft and pleasing, whence Milton speaks of "flutes and soft recorders."

RECUSANT (Lat. *recusare*, to refuse), a term of frequent occurrence in English ecclesiastical history, and used to designate those persons in general who refused or neglected to attend divine service on Sundays or holidays in the established church, or to worship God according to its forms. The use of the word to designate a legal offence is traced to the first year of Queen Elizabeth, when it was enacted that all persons who, without reasonable excuse, failed to attend some usual place of prayer, should be censured and fined for every omission 12 pence. In 23 Elizabeth the fine or forfeiture was made for every month 20 pounds; and in 35 Elizabeth it was enacted that if recusants failed to submit within three months after conviction, they might, upon the requisition of four justices of the peace, be compelled to abjure and renounce the realm; and if they did not depart, or if they returned without license of the crown, they were guilty of felony and should suffer death without benefit of clergy. In the case of recusants who professed the Roman Catholic religion, and who were designated popish recusants, the laws were more severe; in addition to the above general penalties, they were disabled from taking lands, either by descent or purchase, after the age of 18, until they renounced their errors, and were incapacitated in several minor rights of the subject. "Popish recusants convict," as they were called after being convicted, were virtually outlaws. Protestant dissenters were relieved from the penalties of recusancy at the revolution by the toleration act. This statute contained a proviso depriving of its benefit any papist or popish recusant, or any person who should deny the doctrine of the Trinity; but Roman Catholics were exempted from prosecution by 31 George III. in 1791, and more fully by the Catholic emancipation act of

1829. In 1813, by 53 George III., relief was extended to those who denied the doctrine of the Trinity; but the statutes against recusancy still exist, though they are seldom enforced, against persons who absent themselves from church, being neither Roman Catholics nor Protestant dissenters.

RED. See **LIGHT**, vol. x., p. 440, and **PIGMENTS**.

RED BIRD. See **CARDINAL BIRD**.

REDBREAST. See **ROBIN**.

REDDING, Cyrus, an English journalist and author, born in Penryn, Cornwall, in 1785, died in London, May 28, 1870. He went to London in 1806, was engaged upon the staff of "The Pilot," and established and conducted the "Plymouth Chronicle." From 1815 to 1818 he resided in France, where he edited "Galignani's Messenger." He was editor of the "New Monthly Magazine" from 1820 to 1830, jointly with the poet Campbell, with whom in the latter year he began the "Metropolitan," which proved unsuccessful. Subsequently he edited for two years the "Bath Guardian," and in 1836 established the "Staffordshire Examiner," both liberal in politics. He returned to London in 1840. His works include a collection of poems published under the title of "Gabrielle" (1829); "History and Description of Modern Wines" (1833), which has been many times republished; "Fifty Years' Recollections, Literary and Personal" (3 vols., 1858); "Keeping up Appearances," a novel (1860); "French Wines and Vineyards, and the Way to Find them" (1860); "Literary Reminiscences and Memoirs of Thomas Campbell" (2 vols., 1860), originally contributed to the "New Monthly" soon after the poet's death; "All's Well that Ends Well" (1862); "Memoirs of Remarkable Misers" (2 vols., 1863); "Yesterday and To-day" (1863); and "Past Celebrities whom I have Known" (2 vols., 1865).

REDEMPTION, Equity of. See **MORTGAGE**.

REDEMPTORISTS, or Congregation of the Most Holy Redeemer, known also as Liguorians, a society of missionary priests in the Roman Catholic church, founded by St. Alfonso Maria da Liguori. The foundation of the society dates from Nov. 9, 1732, when Alfonso, with twelve priests, two candidates for orders, and a rich gentleman who volunteered to serve them as lay brother, united in community at Scala, in the Neapolitan province of Benevento. After laboring together successfully for some time, Alfonso deliberated with his companions on the choice of a rule of life; but the diversity of opinions among them became irreconcilable, and they dispersed, one priest and the lay brother, Vito Curzio, remaining with Alfonso. As Alfonso continued his labors, new members flocked to him, several houses were established, and the rules drawn up by him for the government of the society were approved in 1749 by Pope Benedict XIV., Alfonso himself being chosen superior general for life.

The rule of the Redemptorists prescribes, besides the three usual monastic vows, a fourth, which obliges the members to accept outside of the order no dignity, office, or benefice, except upon an express order of the pope or the superior general, and not to leave the order unless by special permission of the pope. The principal sphere of action of this order has been the conducting of what is called a "mission," lasting one, two, or more weeks, during which time the missionaries endeavor to prevail upon all the members of a church to devote their time principally to religious exercises and a thorough reformation of their lives. St. Alfonso and his companions followed in this the method of the Jesuit missionaries in Italy. When the Jesuits were suppressed by Clement XIV., Alfonso aimed at replacing them by his order as popular instructors. This circumstance, and Alfonso's known love for the suppressed order, caused the Redemptorists to be not unfrequently confounded with the Jesuits. The order spread early from Naples into Sicily and the Papal States; but even before the death of the founder all the houses in the kingdom of Naples were excluded from the order, because they had procured a ratification from the government at the expense of important and unauthorized alterations of their rule. The division lasted till 1790, when a reunion was effected. The first German members established missions in Courland and at Warsaw, but both succumbed to the wars arising out of the French revolution. In Austria they have had since 1808 many influential patrons, and it has ever since remained one of the most important provinces of the order. In France they suffered some losses from the interference of the government in 1830, and again in 1861. They have found an important sphere of action in the United States, whither they first came in 1841, and where they principally labor among the German population. In 1858 a number of American Redemptorists left the order and established with the pope's sanction an independent missionary congregation. (See **PAULISTS**.) In 1874 they were called to Canada and placed in charge of St. Patrick's church, Quebec. In 1870 the Redemptorists were involved with the Jesuits in the decree of the Italian parliament suppressing all religious orders in Italy; in 1873 their central residence in Rome was also suppressed. In the latter year the German parliament decreed their expulsion from Germany, and on May 31, 1875, another decree sequestered their property and deprived them of all civil rights in Prussia. A similar proscription swept away their houses in Switzerland and banished their members. In France, where they possessed eleven houses in 1869, their numbers have not increased since the war, the French government refusing the Redemptorists exiled from Germany permission to settle there. These have taken refuge principally in the British empire and colonies, and in the United States. In this country

they have (1875) houses in Maryland, Massachusetts, Louisiana, Mississippi, and Illinois.—A congregation of Redemptorist nuns, which was likewise founded by Liguori in 1732, has never extended itself widely.

REDFIELD, Isaac Fletcher, an American jurist, born in Weathersfield, Vt., April 10, 1804, died in Boston in March, 1876. He graduated at Dartmouth college in 1825, studied law, and practised at Derby and afterward at Windsor, Vt. From 1835 to 1860 he was a judge of the supreme court, being chief justice from 1852; and from 1858 to 1862 he was professor of medical jurisprudence in Dartmouth college. In 1861 he removed to Boston. From January, 1867, he was for two years special counsel of the United States in Europe, having charge of many important suits and legal matters in England and France. He received the degree of LL. D. from Trinity college in 1848, and from Dartmouth in 1855. He published "The Law of Railways" (1857; 5th ed., 2 vols., 1873); "The Law of Wills" (3 vols., 1864); "The Law of Carriers and Bailments" (1869); "Leading American Railway Cases" (2 vols., 1870); and with W. A. Herrick, "A Treatise on Civil Pleading and Practice" (1868). From 1862 he was one of the editors of the "American Law Register" (Philadelphia); and he also edited Story "On Equity Pleadings" and "Conflict of Laws," and Greenleaf "On Evidence," and contributed very largely to periodicals.

REDFIELD, William C., an American meteorologist, born in Middletown, Conn., March 26, 1789, died in New York, Feb. 12, 1857. In early life he was a mechanic. In some pedestrian journeys he observed the course of the hurricane in September, 1821, long known as the "great September gale," and became convinced that the storm, instead of moving in a straight line, according to what was then supposed to be the law of such storms, had rotated around a central point, and that its movement had been in curved lines. Having established a line of steam tow boats on the Hudson, and taken up his residence in New York, he investigated the connection of steam with navigation, and in pamphlets, essays, and published letters discussed the causes of steamboat explosions, the means of safety, and the necessity of careful and frequent inspection. In 1828 he published a pamphlet urging the importance of a system of railways to connect the waters of the Hudson with those of the Mississippi; and he was largely engaged in promoting railroad construction. In 1831 he first gave to the public his "Theory of Storms," and three years later an elaborate article on the hurricanes of the West Indies. After 1836 he devoted much time to the investigation of the fossil fish of the Connecticut valley and the sandstones of the Atlantic coast in New Jersey, Virginia, and North Carolina, and made a very large collection of them; and he read before the American association for the ad-

vancement of science several papers on those fossils. He published during his life 62 essays, of which 40 pertain to meteorology; the best known are accounts of hurricanes. (See HURRICANE, and METEOROLOGY.)

RED FIN. See DAOE.

REDGRAVE, Richard, an English painter, born in London, April 30, 1804. He studied at the royal academy, and in 1837 exhibited his first successful work, representing "Gulliver on the Farmer's Table." His subsequent genre pictures delineate the sufferings of the poor, and at a later period he painted landscapes. His most celebrated pieces are "Country Cousins," "Cinderella," "Ophelia," "The Governess," and "Bolton Abbey." He was elected to the royal academy in 1857, and holds (1875) the offices of inspector general of art schools, for which he has prepared a system and course of instruction, and surveyor of crown pictures. He has published "An Elementary Manual of Colors" (London, 1863), and in conjunction with his brother, Samuel Redgrave, "A Century of Painters of the English School" (1866). The latter has also published "A Dictionary of Artists of the English School" (1874).

REDI, Francesco, an Italian naturalist, born in Arezzo, Feb. 18, 1626, died in Pisa, March 1, 1698. He was physician to successive grand dukes at Florence, and acquired a high reputation in his profession, and also as a naturalist, classical scholar, and poet. He belonged to the school of Galileo, and his writings are alike distinguished for depth of scientific inquiry and philosophic acumen. He first clearly enunciated the doctrine that all living organisms must have originally sprung from preëxisting germs, and contended that in all cases of the apparent production of organized beings from dead matter, as in putrefactions and animal and vegetable infusions, the previous existence or subsequent introduction of such germs must be presumed. He openly attacked the doctrines of the abiogenists, or defenders of the theory of spontaneous generation, opposing their assertions by a series of simple and for the time almost conclusive experiments, which still serve modern naturalists as a basis in similar researches. (See SPONTANEOUS GENERATION.) His most important works are *Osservazioni intorno alle vipere* (4to, Florence, 1664; Latin translation, Amsterdam, 1678); *Esperienze intorno alla generazione degli insetti* (1668; Latin, 1671), which had many editions; and *Osservazioni agli animali viventi che si trovano negli animali viventi* (1684). The finest of his poems is *Bacco in Toscana* (1685), a eulogy of the wines of Tuscany. He also wrote lives of Dante and Petrarch. The latest edition of his complete works was published at Milan in 1809, in 9 vols. 8vo.

RED JACKET (SA-GO-YE-WAT-HA), a principal chief of the Senecas, of the Wolf tribe, born at Old Castle, near the foot of Seneca lake, in 1752, died at Seneca Village, near Buffalo, N. Y., Jan. 20, 1830. His original In-

dian name was O-te-ti-ani, "Always Ready," that of Sa-go-ye-wat-ha, "He keeps them awake," having been conferred upon him on his election to the dignity of a sachem. The name of Red Jacket arose from a richly embroidered scarlet jacket presented to him by a British officer, which he always took great pride in wearing. Of his early history little is known except that he was remarkably swift in the chase, and was often employed as a messenger, first among his own people, and during the revolution as a runner for the British officers on the border. In 1784, in a council held at Fort Stanwix to negotiate between the United States and the Six Nations for the cession of lands, he spoke very eloquently against the treaty, but with no avail. A few years later Red Jacket had an interview with Washington, who gave him a silver medal. In 1809 he gave information to Erastus Granger, the Indian agent, of the organization by Tecumseh of an extensive league by which the Senecas were to be drawn into a combination against the United States. In 1810 he visited Washington, and delivered an able speech upon this subject before the secretary of war. In the war of 1812 he on several occasions gave advice which proved of essential service to the American army, especially on the eve of the battle of Chippewa. In 1829 Red Jacket visited New York on his way to Washington, and while there sat for his portrait to Robert W. Weir. Although in his 77th year, he was still strong and vigorous. In his later years he was grossly intemperate, but invariably abstained from fire water for a season before a council. Red Jacket was upon the war path during both conflicts between the United States and Great Britain, in the first on the British and in the second on the American side; but in neither did he win the right to wear the eagle plume. His character was marked by striking contradictions. He lacked firmness of nerve, but possessed unbending firmness of purpose and great moral courage. His intellectual powers were of a very high order. He was a statesman of sagacity, and an orator of surpassing eloquence, yet capable of practising the lowest cunning; but he was still a patriot, and loved his nation and his race. His life has been written by W. L. Stone (8vo, Albany, 1867).

REDOUTÉ, Pierre Joseph, a French painter of flowers, born at St. Hubert, near Liège, July 10, 1759, died in Paris, June 19, 1840. He belonged to a family of painters, and, having settled in Paris, painted some of the most elegant flowers in the series known as the *collection des velins*, commenced under Louis XIV. In 1822 he became professor of vegetable iconography at the *jardin des plantes*. His magnificent works, *Les Uliacées* (8 vols. fol., Paris, 1803-'16), and *Les roses* (3 vols. fol., 1817-'24), are the finest known specimens of botanical illustration. A copy of the former on vellum, with the original drawings, was purchased by the empress Josephine for

84,000 francs. He invented a method of painting in colors, for which he received a medal from the society for the encouragement of national industry.

REDPOLL. See LINNET.

RED RIVER, a tributary of the Mississippi, and the last of considerable size which it receives. It rises in N. W. Texas, in about lat. 34° 40' N. and lon. 102° 10' W., and flows E. to the 100th meridian. Thence it follows a direction a little S. of E., separating Texas from Indian territory and Arkansas, and entering the latter state, bends at Fulton to the south, passes into Louisiana, and afterward flows S. E., entering the Mississippi 341 m. above its mouth. Its length is about 1,200 m., and its basin is about 97,000 sq. m. in extent. Its sources are in the fissures of an elevated and barren plain, the Llano Estacado, 2,450 ft. above the sea. For about 60 m. the banks rise perpendicularly from 500 to 800 ft. After leaving the Llano Estacado it flows over a broad bed of light shifting sands through an arid prairie country to the "cross timbers," a belt of woodland between the 98th and 97th meridians. Below this the river flows through rich and densely wooded alluvial bottoms. "Here the borders contract, and the water for a great portion of the year washes both banks, carrying the loose alluvium from one side and depositing it on the other, in such a manner as to produce constant changes in the channel, and to render navigation difficult. This character continues throughout the rest of its course; and in this section it is subject to heavy inundations, which often flood the bottoms to such a degree as to destroy the crops, and occasionally leave a deposit of white sand, rendering the soil barren and worthless." From its source to Fulton, Ark., about 600 m., the stream falls 2,208 ft.; thence to its mouth, 595 m., the fall is only 188 ft. The width between the banks 8 m. below the point where it issues from the Llano Estacado is 2,700 ft.; just below the mouth of the North fork, 2,000; 50 m. lower down, 2,100; at the mouth of the Big Wichita, 600; at Alexandria, La., 720; at the mouth of the Black river, 785; and at the entrance into the Mississippi, 1,800. "The depth varies inversely as the width, being only 6 or 8 ft., even in floods, throughout the desert, while it is some 50 ft. in the fertile region. In extreme low water a depth of 3 ft. may be depended upon below Alexandria, about 4 ft. thence to the head of the raft, and 1 ft. thence to Fort Towson (Indian territory). Steamers of 4 ft. draught can ascend to Shreveport, La. (330 m. above its mouth), at any time except in extreme low water, but to Fort Towson or even Fulton for only about three months in the year, and frequently only run in one direction during a single rise." The river is generally highest from December to June or July, the rest of the year being the season of low water. The raft has been a

serious obstacle to navigation, as it required the boats to leave the channel and pass through lakes and bayous. The "great raft," an immense collection of trees and drift wood, extended from near Grand Ecore to a little below Shreveport when the United States first undertook its removal. Capt. Shreve opened a navigable channel through it in 1835-'9. Meanwhile, from continued accessions of drift timber, the head of the raft was carried above Shreveport to near Hurricane bluff. This portion was opened by Gen. Williamson and Capt. Linnard from 1841 to 1845. In 1871 the foot of the raft was at Carolina bluff, a few miles above Hurricane bluff, and its head near Springbank, about 45 m. above its foot. Operations were begun on this raft, under the direction of Lieut. Woodruff, on Dec. 1, 1872, which resulted in opening a navigable channel through its whole length in November, 1873. At a small annual expense for a few years the renewal of the raft may be prevented, and an excellent cotton region between Shreveport and Fulton developed. Red river receives its name from its peculiar color, supposed to be derived from the red clay of the gypseous formation through which its upper course lies. The chief tributaries on the left bank are the North fork (a little W. of the 99th meridian) and the Washita, in Indian territory; Little river, in Arkansas; and Black river, formed by the Washita and Tensas, which enters in Louisiana not far from the Mississippi. On the right bank the chief tributaries are the Pease and Big Wichita rivers, which enter from W. Texas. In Louisiana Red river sends off numerous bayous, which find their way back again to the main stream, forming frequent lakes. —In the spring of 1864 an immense expedition of combined land and naval forces, the former under Gen. Banks and the latter under Admiral Porter, was sent up the Red river to capture Shreveport and thus open up the great cotton districts of Texas. It was unsuccessful, Banks's defeat at Sabine Cross Roads by Gen. Kirby Smith (April 8) compelling also the retreat of the fleet down the river. This was effected with great difficulty and loss, the river being very low and still falling, and the gunboats and transports exposed to the fire of the confederate forces from the banks. On reaching the falls, near Alexandria, further progress would have been impossible but for the bold conception and construction of a dam by Lieut. Col. Bailey of Wisconsin. (See ALEXANDRIA, La.) The main dam still remains intact, and the river has formed a new channel on the W. shore.

RED RIVER. I. A N. parish of Louisiana, intersected by Red river, and bounded E. by Black river; area, 325 sq. m. It has been formed since the census of 1870. The surface is level, and the soil fertile and productive of cotton and corn. Capital, Coushatta Chute. II. A N. E. county of Texas, separated from the Indian territory by Red river, and bounded S. by Sulphur river, one of its branches;

area, 872 sq. m.; pop. in 1870, 10,653, of whom 4,148 were colored. It has an undulating surface and fertile soil. The chief productions in 1870 were 385,840 bushels of Indian corn, 13,444 of oats, and 3,069 lbs. of wool. There were 2,522 horses, 1,242 mules and asses, 3,813 milch cows, 868 working oxen, 9,547 other cattle, 1,739 sheep, and 20,131 swine. Capital, Clarksville.

RED RIVER OF THE NORTH, a stream rising in Elbow lake, 1,680 ft. above the sea, on the border of Becker and Beltrami counties, Minnesota, in about lat. 47° 10' N. and lon. 95° 25' W. It flows S. for about 100 m. through several small lakes to Otter Tail lake in the county of the same name, and thence W. 100 m. to Breckinridge, Wilkin co. (lat. 46° 15', lon. 96° 35'), whence it runs N. about 550 m., separating Dakota from Minnesota and dividing Manitoba into two unequal parts, and empties into the S. extremity of Lake Winnipeg (628 ft. above the sea) through six mouths, amid extensive marshes, about lat. 50° 30' and lon. 96° 50'. It is very tortuous, its length being about twice that of straight lines following its three principal directions. The portion between Breckinridge and Otter Tail lake is also called Otter Tail river, the term Red river being sometimes restricted to the portion below Breckinridge. It is sluggish, except at the rapids or chutes, flowing through a very flat prairie, between clay banks varying from 20 to 60 ft. in height. The area within the United States drained by it is about 32,000 sq. m., in which the annual rainfall is comparatively small. The water is muddy but agreeable to the taste. The river is subject to annual spring freshets, very variable in duration and height, which are due to ice gorges. Its valley is but thinly settled. The principal towns along its banks, all of which are small, are Breckinridge, McCauleyville, and Moorhead in Minnesota, Fargo and Pembina in Dakota, and Winnipeg or Fort Garry in Manitoba. Between Moorhead and Fargo, 50 m. N. of Breckinridge, the Northern Pacific railroad crosses it. The business on the river consists principally in carrying supplies for the settlements in Manitoba and bringing back furs. Two or three small steamers ply in summer between Moorhead and Fort Garry, and a considerable amount of freight is floated down in flats. At Breckinridge the Red river receives the Bois de Sioux or Sioux Wood river, flowing N. from Lake Traverse. The chief tributaries from the west are the Wild Rice, Cheyenne, Elm, Goose, Turtle, Big Salt, Little Salt, and Pembina rivers in Dakota, and the Scratching and Assiniboin rivers in Manitoba, the latter being its largest affluent. From the east the principal tributaries are the Buffalo, Sand Hill, Red Lake, Snake Hill, and Two rivers in Minnesota, and the Roseau or Reedgrass river and the rivière Seine in Manitoba. These streams drain an immense number of small lakes.

RED SEA, an inlet of the Indian ocean, extending from the straits of Bab-el-Mandeb, lat. $12^{\circ} 40'$ N., nearly N. N. W. to Suez, lat. $29^{\circ} 57' 30''$, and separating Arabia on the east from Egypt, Nubia, and Abyssinia on the west. Its length is about 1,400 m., its greatest breadth, near lat. 16° , 200 m., and its total area about 185,000 sq. m. At the straits of Bab-el-Mandeb, by which it is joined to the Indian ocean, it is but 18 m. wide, at Hodeida about 95 m., and at Jiddah about 120 m. At Ras Mohammed, lat. $27^{\circ} 45'$, it is divided into two branches by the rocky peninsula of Mt. Sinai or Jebel Musa. The western branch, the gulf of Suez, which is the continuation proper of the Red sea, is about 180 m. long, and has an average breadth of 20 m. It has the same general course as the main part of the sea, with which it is connected by the strait of Jubal. At its N. extremity the Suez canal connects it with the Mediterranean, from which it is separated by the isthmus of Suez. The eastern branch, the gulf of Akabah, extends N. N. E. from its mouth at the strait of Tiran, about 100 m., and has an average breadth of about 12 m. The Red sea varies greatly in depth. In the middle of the gulf of Suez it is from 250 to 300 ft. deep, but shoals gradually to 18 or 20 ft. in the harbor of Suez, where it has been filled up by the sand. The gulf of Akabah varies from 700 to 1,500 ft. in depth. The deepest sounding obtained is in the Red sea proper, in lat. $22^{\circ} 30'$, where the depth is 6,324 ft. In the S. part it is shallower, and below lat. 16° its depth ranges from 250 to 750 ft. A section through the middle of the sea from the straits of Bab-el-Mandeb to Suez represents a series of rounded submarine hills, covered with silt, mud, and sand. The sand, which is blown in from the neighboring deserts, constitutes the only distinctive feature between this ooze and that of the bottom of the Atlantic. Near the shores on both sides the water is generally shallow, and navigation is rendered dangerous by many rocky islands, shoals, and coral reefs. The principal islands are the Farsan group on the Arabian coast, about lat. 17° , and the Dahlac group on the W. side, in lat. 16° , each consisting of large islands surrounded by many smaller ones connected by reefs. In lat. $15^{\circ} 40'$ is Jebel Teir, having an active volcano, the summit of which is more than 1,000 ft. above the sea. Nearly S. of it is the Zebayer group. Kamaran island, off the coast of Yemen, is claimed by the British. In lat. 14° is Jebel Zugur, and in the straits of Bab-el-Mandeb, commanding the entrance from the Indian ocean, is Perim, a fortified British possession. (See PERIM.) At the entrance of the gulf of Akabah is the island of Tiran, dividing it into two channels, of which only the western one, called the strait of Tiran, is navigable for large vessels; and at the mouth of the gulf of Suez are Shadwan island and several smaller ones.—The Red sea occupies the bottom of a longitudinal valley lying between the highlands of

Arabia on the east and the mountain range on the west, which borders Abyssinia, Nubia, and Egypt. On the N. side, between the gulf of Suez and the Mediterranean, the country is low and flat, and exhibits indications that a communication once existed between the two seas. The mountains are in sight on both sides of the sea, but a considerable part of each coast is low and flat or covered with undulating hills, the mountain range being in some places 20 or 30 m. from the shore. It is probable that the sea once covered the entire basin, but has been filled up in part by the growth of coral and the accumulation of sand. The Arabian town of Muza, marked as a seaport in the *Periplus of Arrian*, is now several miles inland. The coral reefs, which are more extensive than in any other sea of equal size, lie generally in long lines parallel to the shores, and from 500 yards to a mile distant from them. The banks are usually from 4 to 6 ft. below the surface, and the water on their outer edge is very deep, but on the inner side they are sometimes connected with the land. Where they are unconnected with the shore there is generally a channel within them navigable for small vessels and having good anchorage. The native vessels make great use of these inner straits, where the heavy winds of the open sea affect them but little. There is no surf on the reefs, as the porous coral permits the passage of the waves through them. The reefs are more numerous on the E. than on the W. side. The growth of continental coral reefs in the Red sea in a more northerly latitude than elsewhere is accounted for by the absence of rivers on the coast, and by the high temperature of the water, which is seldom below 80° F. In March and April it is sometimes 84° , and in May 90° . The genera of coral are nearly the same as in the central Pacific, and consist of most of the reef-forming species. Some of the meandrinæ and faviæ are from 6 to 9 ft. in diameter. The coral is generally white, but often red, and a black variety is found along the Arabian coast for 50 m. N. and S. of Jiddah. Sponges of fine quality are taken in abundance along the E. shore of the gulf of Suez, and pearl oysters are found in various places. As the Red sea receives but little water from the atmosphere or from the surrounding country, and the sun's rays generally fall on it from a cloudless sky, it may be considered merely a basin for evaporation, which proceeds at the rate of about four fifths of an inch a day, or 23 ft. in a year. From a little more than 39 parts of salt in 1,000 at the straits of Bab-el-Mandeb, the proportion rises in the N. part to 43, a degree of saltiness found elsewhere only in inland salt lakes. As the concentration of so much salt through evaporation would tend in time to fill up the sea, it is supposed that the waters most charged with salt flow out through the straits in an undercurrent, while the lighter and less saline waters flow in above it.—The winds are generally pretty constant.

From October to May they blow from S. S. E., being strongest in February; the rest of the year they are from N. N. W., and the strongest in June and July. Sailing vessels find great difficulty in beating up against the wind from May to November, and the pilgrim ships from India are often obliged to put in at Hodeida and forward their passengers to Mecca and Medina by land. The tidal wave enters but a little way into the Red sea, and no ebb and flow of the tide is noticeable at the N. extremity. The currents seem to be governed entirely by the winds. When the S. wind blows the water flows toward the gulf of Suez, and the surface is 2 ft. higher than when the N. wind prevails; and after long continued N. winds the upper part of the gulf of Suez is sometimes fordable. In general the waters are at the same level with those of the Mediterranean. The atmosphere of the Red sea is very oppressive during the hot months. In the latitude of Jiddah the average day temperature from December to March is 76°; from March to the end of May, 87°; during June, 93°; in July, August, and September, 100°; and in October and November, 85°. When the S. wind blows in summer the temperature is frequently 107°, and during the simoom, which blows from N. E. and E. N. E., but generally for a few hours only, it sometimes rises to 132°.—The principal ports of the Red sea are: on the gulf of Suez, Suez and Tor; on the African coast, Kosseir, Suakin, and Massowa; and on the Arabian coast, Yambo, the port of Medina, Jiddah, the port of Mecca, Loheia, Hodeida, and Mocha. There are many other small harbors and inlets, frequented by the Arabs, who carry on most of the local commerce, and who from long experience are acquainted with all the intricacies of the coast navigation. There are several lighthouses: one on Perim, one on the Dædalus shoal, about 200 m. N. of Jiddah, one at Ras Sharib on the W. side of Jubal strait, and three in the gulf of Suez. There is a submarine telegraph cable from Aden to Suez through the Red sea, which since the completion of the canal has become once more the highway of travel and commerce between the Mediterranean and India. (See CANAL, and SUEZ.)—The Red sea is often referred to in the Hebrew Scriptures under the name of Yam Suph, the sea of weeds, so called, it is supposed, from a small seaweed thrown up by its waters, probably the *rytiphlea pinastroides*. The name Red is generally traced directly from the Latin *Rubrum* and Greek *Ἐρυθρά*, which were applied to this sea in common with the Persian gulf and Indian ocean by Herodotus and other ancient writers. (See ERYTHRÆAN SEA.) Its origin has been variously deduced from the redness of the surrounding hills, of the coral reefs, of the seaweed, and of the water from the presence of animalcules, from early Phœnician (Gr. *φαινέ*, red) dwellers on the shores of the Erythræan, and from Edom, "red,"

the Hebrew and Phœnician name of a country adjoining the gulf of Akabah. Himyar, the name of the founder of the Himyarite kingdom of S. W. Arabia, is supposed also to be derived from the Arabic *ahmar*, "red." The most interesting historical incident connected with the Red sea is the passage of the Israelites across it in their flight from Egypt. (See EXODUS.) By the Red sea in ancient times the trade between India and the countries on the Mediterranean was carried on; and upon this sea and the other inland gulfs and seas of this part of the old world the earliest commercial operations were conducted, and the first experience in navigation was gained. The Egyptians and Phœnicians established this trade with India, and so important was it to the former people, that the Pharaoh whom the Greeks call Sesostris is related to have had upon the Arabian gulf a fleet of 400 long vessels or ships of war, by means of which he protected it and subjugated the people on the borders of the sea who interfered with it. King Solomon built "a navy of ships in Ezion-geber, which is beside Elath, on the shore of the Red sea, in the land of Edom." (1 Kings ix. 26.) Ezion-geber was at the head of the gulf of Akabah, and these ships constituted the fleet which went to Ophir. For a long time the Heroöpolite gulf or gulf of Suez was the chief avenue of the Egyptian traffic; but the shoaling of the water at the head rendered navigation dangerous, and in the reign of Ptolemy Philadelphus this route was nearly abandoned in favor of that by way of the new port of Berenice, near lat. 24°, which was connected by a well constructed road with Coptos on the Nile, whence boats conveyed the merchandise to Alexandria. Myos-Hormos, about lat. 27° 20', was also an important port under the Ptolemies and the Romans, and according to Strabo 120 ships left it annually for India. After the Mohammedan conquest of Egypt, a large commerce was carried on by the Arabs through the Red sea with India and China. In the middle ages the Genoese and Venetians were largely engaged in this trade, until the discovery by the Portuguese of the route by the cape of Good Hope, when the Red sea lost its commercial importance. This was in part revived when the English established the overland route to India, *via* the Cairo and Suez railway; and since the opening of the Suez canal this ancient route has once more assumed its former importance.

REDSHID PASHA. See RESHID PASHA.

REDSTART, the common name of an American and a European genus of birds of the warbler family. In the American genus, *setophaga* (Swains.), the bill is as in the flycatchers (in which family they are included by some authors), and abruptly curved and notched at the tip; the wings rounded, with the second to fourth quills longest; tail long, graduated, and broad; tarsi and toes short. There are many species, mostly in South and Central America, brilliantly marked with red,

yellow, and black; the South American species have more or less yellow in their plumage, and the Mexican are usually black and red. The best known species in North America is the common redstart (*S. ruticilla*, Swains.), of the subfamily *syloicolinae*; it is about 5½ in.



American Redstart (*Setophaga ruticilla*).

long with an alar extent of 8 in.; in the male the prevailing color is black, with the base of the wings and tail and sides of breast reddish orange; abdomen, under tail coverts, and central line on breast white; in the female the black is replaced by olive-green above and brownish white below, the head is ashy, and the red is changed to yellow. It is found throughout the eastern United States to the plains of the Missouri, and sometimes wanders to the West Indies in winter; it is very handsome, always in motion on the trunks and branches of trees in search of insects and larvæ, jumping quickly from side to side, displaying the brilliant tail at every movement, and now and then darting off after an insect on the wing, or descending to the ground in a spiral or zigzag manner; it pursues other birds as if in sport, snapping the bill violently. The nest is placed in a low bush, suspended to the twigs, and is of delicate structure; the eggs are four to six, white, with ash-gray and blackish spots; a single brood is raised in a season.—The European redstart belongs to a different subfamily of the warblers, that of the *erythacinae*, and to the genus *ruticilla* (Brehm), peculiar to the old world. The *R. phanicura* (Brehm) is a little more than 5 in. long; in the male the bill, legs, feet, cheeks, and throat are black; the breast, rump, and sides red; forehead white; crown, hind neck, and back deep blue-gray. It occurs all over Europe, and is a visitor to Great Britain from April to September; it is a very fine songster, heard the summer long in orchards, hedge rows, gardens, and ivy-covered walls; the male is very affectionate, and sometimes sings to his mate as late as

ten at night and as early as three in the morning; it feeds on insects, worms, and berries; the eggs, four to six, are greenish blue, and laid in holes of trees or in a nest on the ground. It is much prized as a cage bird; if taken young, it may be taught to imitate the notes of most other birds, and even to whistle a tune. The name in both hemispheres is derived from the constant jerking motions of the bird, displaying the red of the tail.

RED WILLOW, a S. county of Nebraska, bordering on Kansas, formed since the census of 1870; area, 720 sq. m. It is intersected by the Republican river and its branches. The surface is undulating or level.

REDWOOD. See **SANDAL WOOD**, and **SEQUOIA**.

REDWOOD, a S. W. county of Minnesota, bounded N. E. by the Minnesota river, and intersected by the Redwood, Sleepy Eye, and Big Cottonwood rivers; area, about 1,100 sq. m.; pop. in 1870, 1,829. The surface is uneven and consists largely of prairies; the soil is good. The chief productions in 1870 were 5,409 bushels of wheat, 2,240 of Indian corn, 6,978 of oats, 1,880 of potatoes, and 882 tons of hay. Capital, Redwood Falls.

REED (*A. S. hreed*), a name of tall coarse grasses, especially of the genera *phragmites* and *arundo*. The common reed of this country and England was called *arundo phragmites* by Linnaeus, but later botanists have considered it sufficiently distinct to form a new genus *phragmites* (Gr. *φραγμιτες*, growing in hedges, though the plant is an aquatic), but some still retain it in *arundo*; in recent American works it is given as *P. communis*. It is a stout per-



Common Reed (*Phragmites communis*).

ennial grass, 6 to 12 ft. high, with numerous broad leaves, and bearing a large terminal, purplish brown panicle, which is sometimes a foot long, very loose and nodding; each spikelet consists of three to seven flowers, surrounded by long silky hairs. This is found over a

large part of both continents, on the edges of ponds, in ditches and marshes, and where it occurs abundantly looks at a distance like a field of broom corn. In Europe the reed is utilized in various ways; it is planted by the margin of streams in order that its long and branching rootstocks may bind the soil and prevent the encroachment of the water upon the banks; animals will eat the herbage when quite young, but it soon becomes too tough for them. In northern Europe the stems are valued for thatching, being much more durable than straw, and rude huts are sometimes constructed from them; and they are used for making hurdles and for other domestic purposes, among which is that of weaving mats for screening wall fruit, covering hotbeds, and protecting plants in various ways; it is said that the flower panicles are used in Sweden to afford a greenish dye. As the plants form dense and tall thickets, they afford protection to various water and marsh birds and quadrupeds. In ornamental grounds where there is a moist locality, the reed may be introduced with good effect as an ornamental plant.—The Cyprus reed, *arundo donax*, is a much more robust plant, growing 15 ft. or more high, with abundant leaves and very large terminal panicles of a brownish white color; it is found in southern Europe, eastern Asia, western Africa, and on this continent in Mexico and Texas; and it is apparently the reed mentioned in Scripture. It is used as supports for vines, for fishing poles, and various other purposes. There is a variegated form, *A. donax versicolor*, in which the leaves are marked with very distinct bands of white and green; it is one of the best of variegated plants, holding its markings under the hottest sun, but it does not grow so tall as the green kind. Both forms are occasionally seen in northern gardens, where it is necessary to give their roots a good covering of litter when winter sets in.—The large reed or cane of the southern states is described under CANEBRAKE.—Sea reed is *calamagrostis arenaria* (*ammophila* of some authors), a coarse rigid grass 2 to 3 ft. high, with abundant firm running rootstocks; it is frequent on the coast of Europe, and on our shores from New Jersey to Maine, and along the great lakes. The plant is capable of being utilized to retain blowing sands. Besides the names above given, it has been called *psamma* and *maram* by authors.

REED, Andrew, an English clergyman, born in London, Nov. 27, 1788, died there, Feb. 25, 1862. He studied at Hackney college, and in 1811 was ordained pastor of the Independent congregation in New Road chapel. In 1831 he removed with his congregation to Wycliffe chapel, Stepney, where he continued till his death. In 1834 he was deputed, with the Rev. James Matheson, by the Congregational union of England and Wales, to visit the United States and report on the state of religion and education there; and on his return he pub-

lished with Mr. Matheson "Visit to the American Churches" (2 vols., New York and London, 1836). He founded the London orphan asylum in 1813, the infant orphan asylum in 1827, the asylum for fatherless children at Croydon, the asylum for idiots at Reigate, and the royal hospital for incurables, and left bequests to these institutions. He published "No Fiction" (London, 1818; 24th ed., 1860); "Martha" (1836); "The Day of Pentecost" (1839); "The Revival of Religion," and "Earnest Piety essential to Eminent Usefulness" (1839); and "Advancement of Religion the Claim of the Times" (1847).—See "Memoirs of the Life and Labors of Andrew Reed, D. D." (1863), by his sons Charles and Andrew. The former is a proprietor of the London "Daily News" and president of the Sunday school union of England and Wales; he was elected to parliament in 1872, and in 1873 was a delegate to the conference of the evangelical alliance in New York.

REED, Henry, an American author, born in Philadelphia, July 11, 1808, died Sept. 27, 1854. He graduated at the university of Pennsylvania in 1825, was admitted to the bar in 1829, and in 1835 became professor of rhetoric and English literature in the university of Pennsylvania, retaining this post till his death. In the spring of 1854 he visited Europe, and on his return voyage was lost in the steamer Arctic. He wrote the life of his grandfather Joseph Reed, in Sparks's "American Biography;" "Lectures on English Literature from Chaucer to Tennyson" (1855); "Lectures on English History and Tragic Poetry, as illustrated by Shakespeare" (1855); and "Lectures on the British Poets" (1857).

REED, Joseph, an American patriot, born in Trenton, N. J., Aug. 27, 1741, died in Philadelphia, March 5, 1785. He graduated at the college of New Jersey in 1757. In 1763 he went to England, where he studied law until the troubles produced by the stamp act began, when he returned to Trenton, entered upon the practice of his profession, and in 1767 was appointed deputy secretary of New Jersey. Revisiting England in 1770, he married a daughter of Mr. Dennis De Berdt, agent for the province of Massachusetts Bay, and on his return settled at Philadelphia, took an active part on the side of independence in the political struggles of the time, and through his English connections opened a lengthened correspondence on the subject with Lord Dartmouth, secretary for the colonies. In 1774 he was appointed a member of the committee of correspondence, and in January, 1775, president of the first provincial convention held in Pennsylvania; and he was a delegate to the continental congress which met in May. On the formation of the army he was appointed aide-de-camp and secretary to Gen. Washington. In 1776 he was made adjutant general, and by his local knowledge contributed to the successes at Trenton and Princeton. In 1777

he was appointed chief justice of Pennsylvania, and named by congress a brigadier general; but he declined both offices, and continued to serve in the army as a volunteer, without rank or pay. He was present at most of the engagements in the northern and eastern portions of the Union. In 1778 he was elected to congress, and signed the articles of confederation. About this time he was approached by one of three British commissioners, Gov. Johnstone, with an offer of £10,000 and the most valuable office in America, if he would exert himself to promote a reconciliation between Great Britain and the colonies. His answer was: "I am not worth purchasing; but, such as I am, the king of Great Britain is not rich enough to buy me." He was president of the supreme executive council of Pennsylvania in 1778-'81, and was efficient in suppressing an armed insurrection that occurred in Philadelphia, and a revolt of the Pennsylvania line. He aided in founding the university of Pennsylvania. His "Life and Correspondence" was published by his grandson W. B. Reed (2d ed., Philadelphia, 1847); and his grandson Henry Reed wrote his life in Sparks's "American Biography" (2d series, vol. viii., 1848).

REED BIRD. See BOBOLINK.

REED INSTRUMENTS, among musical contrivances, a numerous and diverse class, including all those the tones of which are due to vibrations imparted to a body of air in a tube, throat, or chamber, by means of the pulsations of a thin lamina or tongue of wood or metal having one end fixed and the other lying over or within an aperture, and actuated by forcibly directing through this a current of air. Technically, such a lamina is termed a reed. It has two general forms. In the first, seen in the clarinet, the reed is larger than the opening through which the air is to pass, and in pulsating alternately closes and opens it, beating against its margins. This form, among European nations doubtless the earliest known, is distinguished as the beating reed. In the second, seen in the accordion, the dimensions of the reed are slightly less than those of the aperture, so that, in pulsating in consequence of an impulse and of its own elasticity, it moves within the current of air only, alternately allowing and interrupting its passage; this is hence termed the free reed. It is proposed to consider in this place only those instruments involving the free reed.—A small, short, metallic tube, containing a single tongue or reed of this form, fitted to yield upon blowing into one end the note A or O, has long been known, and probably first in Germany and Holland, and is termed a pitch pipe. Père Amiot, a French missionary to China, early described the *cheng*, or Chinese organ, a small instrument consisting of a series of tubes, each having its free lamina or tongue, and acted on by the breath of the performer; and this appears to have been in common use in that country from an early period. The accordion was in-

vented in Germany about 1829. The first reed organs, though imperfect, were made in the United States about 1818. Indeed, as early as 1812 Aaron Merrill Peasley obtained a patent for reed instruments; the wording of his claim was sufficiently general to include any form of instrument in which the tones are produced by free reeds caused to vibrate by a bellows and played by a keyboard. This patent is now in possession of the Mason and Hamlin organ company. Mr. J. H. Bazin of Canton, Mass., in 1821, is named as the second inventor. At first the instruments attracted but little attention, owing to their defective construction. Wherever the free reed may have been first applied to the making of a small or hand instrument, the modifications thence arising, especially between about 1825 and 1835, were in rapid succession and numerous. Among the earliest of these were Wheatstone's *æolina* and concertina, the latter in form of a bellows with two hexagonal faces, on the upper of which were four rows of finger stops or studs; by pressing down the latter, air was admitted to act on the corresponding tongues within. The attempts to improve the accordion, by enlarging it and extending its scale, naturally rendered it unwieldy, and thus led to a form of organ with free reeds only, and without pipes, the bellows being worked by the foot. Such were Mr. Green's *seraphine* and the French *mélodivm* (in England and the United States, *melodeon*), one form of which latter, also termed the harmonium, appears to have been the invention of M. Debain of Paris, and improved by MM. Alexandre, father and son. The most improved form of this instrument is now known in France as the *orgue-mélodivm*, or *piano Liszt*; in this country, as the Alexandre organ. Other French instruments, of the earlier date above spoken of, were the *poikilorgue* and *symphonivm*; of the German, some of which were small, and probably all ephemeral, were the *æolophon*, *phys-harmonica*, *æolo-musicon*, &c. In 1841 Mr. Evans of Cheltenham, England, produced a harmonium of two banks of keys and $2\frac{1}{2}$ octaves of pedals; but the instrument was not brought prominently forward till 1859. The objects of this inventor were to overcome the nasal and harsh quality of tone, and the slow speaking, then characterizing the French and English instruments; and he is said to have produced ultimately a pure tone of fine quality, with rapid utterance, and without loss of power. This is the form of harmonium described in English works. In it the several rows or series of reeds designed to give the different registers or parts in the harmony performed are, as in the Alexandre organ, placed horizontally across the instrument, at the same level, and separated from each other by partitions; the arrangement being such that the particular compartments or series to which the air shall be admitted in performing are determined by the knobs or stops that have been drawn

out at the time. (See ORGAN.) In the English, as in the French instruments, also, the tardy response of the reeds to the action of air is corrected in most instances by a device known as the percussion, by which, the proper stop being drawn, the touching of any key instantly causes the blow of a small hammer on the reed, its vibration, thus promptly begun, being then continued by the current of air. In all these forms, moreover, the agitation of the reeds is produced by means of more dense or compressed air forced out of a bellows across the reeds, and acting of course against the ordinary atmospheric pressure on the opposite side; and generally the reeds themselves are placed low in the instrument, often beneath the keyboard, so that the sound is liable to be somewhat smothered or interfered with. Some radical improvements were invented by Mr. J. Carhart (see MELODEON), the changes introduced by him having been worked out as early as 1836, and his instruments being manufactured in large numbers in Buffalo, N. Y., in the year 1846. In the application for his patent Mr. Peasley had stated that the reeds might be caused to vibrate by a force or an exhaust bellows, but that he preferred the latter. The instrument did not however come into extensive use until improved by Mr. Carhart. On the principle of the superior fulness and sweetness of those tones in the accordion made when the air is drawn into the bellows, as compared with those formed by forcing the air out, he so constructed the bellows of the melodeon that it should expel the air from the chamber into which the reed passages opened; this chamber and the space within the bellows freely communicating, and being maintained while playing in the condition of a partial vacuum by means of stout springs, which gradually distend the bellows as often as force has been used to compress and empty it of the entering air. This required that the reeds also should be reversed, the passages admitting air into the exhausted chamber, and the reeds being acted on by the in-flowing streams of air. As a result of this arrangement, all the registers open directly into the one exhausted chamber; and they are conveniently placed in rows one over the other in the manner of shelves or successive segments, each horizontal row divided in the middle to form two registers. The construction of this part of the instrument finally adopted and now in use is the invention of Mr. E. P. Needham. Again, to open the registers, complicated connections and slides are not required, but simply for each a narrow horizontal door hinged on its lower edge, and directly pulled down by a wire making a single angle with the draw-knob. The chamber being during performance partially exhausted, if the edges of the several upright shelves or segments and of the horizontal doors to the registers are properly adapted and faced with soft leather, the external atmospheric pressure

completes the connection of these parts, and secures air-tightness and strength of the whole; while in other instruments the condensed air within operates continually to strain and weaken the connections. Thus, in this instrument, the parts are readily removed for repairs, being stayed by pins only, and as quickly put together again; and the reeds are thus directly accessible. The closing of any register is made to open a small valve within it, called a pneumatic stop, by which communication with the exhausted chamber is at once made both above and below the reeds, and the latter are then within the exhausted chamber; but upon opening the register, this valve closes, and thus other communication is cut off above, and the reeds have the exhausted space now only within, the atmosphere acting from without. The touching of any key is made to open (if the instrument has but one bank of keys) the corresponding valve in every register. When all the registers are open, all the reeds so uncovered are caused by the entering air to sound; if some of the registers only are open, only the reeds in these can sound. With two banks of keys, couplers are required in order to put all the registers at pleasure under command of one. When by couplers the keys have thus been connected with valves in all the registers, the drawing of the knob *grand jeu*, or grand organ, opens all the registers, and affords remarkable power of tone and effect. These arrangements are more common in the larger instruments or harmoniums.—The art of voicing reeds by variously curving and twisting them was invented about 1848, by Mr. Emmons Hamlin of Rome, N. Y., and first applied by the Mason and Hamlin organ company of Boston, New York, and Chicago. This invention has greatly contributed to the present perfection of these instruments, increasing the volume and improving the quality of the tones, and producing some of the differences required for the different registers. It is indeed asserted by the German makers that it was previously known in Europe; but it was not successfully employed there until after the Paris exposition of 1855, where the American reed organs created a lasting sensation. In any reed, the rapidity of vibration, and hence the pitch, depend on several particulars, chiefly the length and weight of the reed, and its relative thickness at the two ends. If the reed is thick at the free end and thin at the fixed, its tone is deep; if the reverse, acute. Hence, the reeds are roughly attuned by giving them certain lengths and thicknesses, and then more accurately by scraping off a little as may be required from the free or the fixed extremity. The Alexandre organ is made of different sizes, the largest corresponding to a 16-ft. pipe organ, and by combinations giving seven octaves. Its usual stops are the English horn and flute, and again the bassoon and hautboy, forming the ordinary diapasons, and answering to the compass from an 8-ft. pipe; drone and clarinet,

an octave below; clarion and fife, an octave above; two forte stops, to increase the volume of sound; a principal, which opens all the stops at once; the two stops first named also actuating the percussion; and two stops, *expression à la main* and expression of pedals, by which superior power of expression, or swell and diminuendo, is secured by merely varying the pressure of the fingers or of the feet. With these are also introduced the *sourdine*, modifying the tone of certain stops, *voix céleste*, *voix humaine*, *musette*, *forte*, *tremolo*, and combination swell. In 1870 nearly 30,000 of these instruments were manufactured in the United States.

REES, Abraham, a British scholar, born at Llanbrynmair, Wales, in 1743, died June 9, 1825. He studied for the ministry at Hoxton academy, near London, and was appointed tutor there in his 19th year, which post he retained for more than 22 years. In 1768 he became also pastor of a Presbyterian congregation in Southwark, and in 1783 in the Old Jewry. From 1786 to 1795 he was also president of the dissenting academy at Hackney. He was a fellow of the royal society of London, and of the Linnean society. Many of his sermons were published. In 1776 he was engaged to edit a new edition of Chambers's "Cyclopædia," which was completed in 1786 (4 vols. fol.); and in 1802 he began "Rees's Cyclopædia," which was completed in 45 vols. 4to in 1819.

REEVE. See **RUFF**.

REEVES, Sims, an English singer, born in Woolwich in 1821. He received his earliest instruction from his father, from H. Callcott lessons in harmony, from J. B. Cramer on the piano, and from Hobbs and T. Cooke in singing. His early vocal instructors mistook the character of his voice, developing it as a baritone, and at 19 Reeves made his début at Newcastle-on-Tyne as Rudolpho in *La sonnambula*. Later he took lessons of Bordogni in Paris, who corrected the mistake as to the quality of his voice, and brought out its true character, that of a tenor of great range. He completed his musical education under Mazzucato at Milan, and before leaving that city appeared at La Scala as Edgardo in *Lucia di Lammermoor*. He made his début in London, at Drury Lane, Dec. 6, 1847, in the same rôle. At the Norwich musical festival in the autumn of 1848 he showed a faculty for interpreting the works of Handel, Haydn, and Mendelssohn, which has made him the leading oratorio tenor in England. He continued to sing with increasing reputation in Italian and English opera and in concert and oratorio till 1856, since which he has sung chiefly in the concert room.

REFORMATION, the historical name for the great religious movement of the 16th century, which divided the Latin Catholic church into two opposing sections, and resulted in the establishment of the various ecclesiastical organizations of evangelical or Protestant Christen-

dom. There were many "reformers before the reformation," and almost every doctrine of Luther had its advocates long before him. The whole struggling of mediæval Catholicism toward reform and liberty; the long conflict between the German emperors and the popes; the reformatory councils of Pisa, Constance, and Basel; the Waldenses and Albigenses in France and northern Italy; Wycliffe and the Lollards in England, Huss and the Hussites in Bohemia, Arnold of Brescia, and Savonarola with his politico-religious reform movement, in Italy; the spiritualistic piety and theology of the mystics of the 14th and 15th centuries; the theological writings of Wesel, Goch, and Wessel in Germany and the Netherlands; the rise of the national languages and letters in connection with the feeling of national independence; the invention of the printing press; the revival of letters and classical learning under the direction of Agricola, Reuchlin, and Erasmus; all these and many similar persons and movements were so many preparations for the reformation of the 16th century. The reformation was originally neither a political nor a philosophical nor a literary, but a religious and moral movement. It started with the practical question: How can the troubled conscience find pardon and peace, and become sure of personal salvation? It retained from the Catholic system all the objective doctrines of Christianity concerning the Holy Trinity and the divine-human character and work of Christ—in fact, all the articles of faith contained in the apostles' and other œcumenical creeds of the early church. But it joined issue with the prevailing system of religion in soteriology, or in the doctrines relating to subjective experimental Christianity, especially the justification of the sinner before God, the true character of faith, good works, the rights of conscience, and the rule of faith. It asserted the principle of evangelical freedom as laid down in the epistles of Paul to the Romans and Galatians, in opposition to the system of outward legalistic authority which held the individual conscience and private judgment bound. It brought the believer into a direct relation and union with Christ as the one and all-sufficient source of salvation, in opposition to traditional ecclesiasticism, and priestly and saintly intercession. The Protestant goes directly to the word of God for instruction, and to the throne of grace in his devotions; while the pious Catholic always consults the teaching of his church, and often prefers to offer his prayers through the medium of the Virgin Mary and the saints. From this general principle of evangelical freedom and direct individual relationship of the believer to Christ proceed the two fundamental doctrines of Protestantism, the absolute supremacy of the word of Christ, and the absolute supremacy of the grace of Christ. The one is called the formal principle, or *principium cognoscendi*; the other the material prin-

ciple, or *principium essendi*. The former proclaims the canonical Scriptures (to the exclusion of the Apocrypha of the Old Testament), and more particularly the word of Christ and the apostles, to be the only and sufficient infallible source and rule of faith and practice, and asserts the right of private interpretation of the same; in distinction from the Roman Catholic view, which declares the Bible and tradition or church authority to be two coördinate sources and rules of faith, and makes tradition, especially the decrees of popes and councils, the only legitimate and infallible interpreter of the Bible. In its extreme form Chillingworth expressed this principle of the reformation in the well known formula: "The Bible, I say, the Bible only, is the religion of Protestants." Genuine Protestantism, however, by no means despises or rejects church authority as such, but only subordinates it to and measures its value by the Bible, and believes in a progressive interpretation of the Bible through the expanding and deepening consciousness of Christendom. Hence, besides having its own symbols or standards of public doctrine, it retained all the articles of the ancient Catholic creeds and a large amount of disciplinary and ritual tradition, and rejected only those doctrines and ceremonies of the Catholic church for which it found no clear warrant in the Bible, or which it thought contradicted its letter or spirit. The Calvinistic branches of Protestantism went further in their antagonism to the received traditions than the Lutheran and the Anglican reformation; but all united in rejecting the authority of the pope (Melanchthon for a while was willing to concede this, but only *jure humano*, as a limited disciplinary superintendency of the church), the meritoriousness of good works, the indulgences, the worship of the holy Virgin and of the saints and relics, the seven sacraments with the exception of baptism and the eucharist, the dogma of transubstantiation and the sacrifice of the mass, purgatory and prayers for the dead, and the use of the Latin language in public worship, for which the vernacular languages were substituted. The other fundamental doctrine of the reformation has reference to the personal appropriation of the Christian salvation, and has for its object to give all glory to Christ by declaring that the sinner is justified before God, *i. e.*, acquitted of guilt and declared righteous, solely on the ground of the all-sufficient merit of Christ as apprehended by a living faith; in opposition to the theory, then prevalent and substantially sanctioned by the council of Trent, which makes faith and good works the two coördinate sources of justification. Genuine Protestantism does not, on that account, by any means reject or depreciate good works; it only denies their value as sources or conditions of justification, but insists on them as the necessary fruits of faith and evidence of justification. To these two prominent principles

of the reformation, which materially affect its theology and religious life, must be added the doctrine of the universal priesthood of believers, and the right and duty of the laity not only to read the Bible in the vernacular tongue, but also to take part in the government and all the public affairs of the church. —We now present an outline of the history of the reformation in the various countries in which it finally succeeded, leaving out Bohemia, Italy, and Spain, where it was suppressed by the combined opposition of the secular and ecclesiastical authorities. I. THE REFORMATION IN GERMANY. The movement in Germany was directed by the genius and energy of Luther and the learning and moderation of Melanchthon, assisted by princes, especially the electors of Saxony, and sustained by the majority of the people in spite of the opposition of the bishops and the imperial government. It commenced in the university of Wittenberg with the protest against the traffic in indulgences, Oct. 31, 1517 (ever since celebrated in Protestant Germany as the festival of the reformation), and soon became a powerful popular movement. At first it moved within the bosom of Catholicism. Luther shrunk in holy horror from the idea of a separation from the religion of his fathers. He only attacked a few abuses, taking it for granted that the pope himself would condemn them if properly informed. But the irresistible logic of events carried him far beyond his original intentions, and brought him into irreconcilable conflict with the central authority of the church. Pope Leo X., in June, 1520, pronounced the sentence of excommunication against Luther, who burned the bull together with the canon law and several books of his opponents. The diet of Worms in 1521, where he made his memorable defence, added to the excommunication of the pope the ban of the emperor. But the dissatisfaction with the various abuses of Rome and the desire for the free preaching of the gospel were so extensive, that the reformation both in its negative and positive features spread in spite of these decrees, and gained a foothold before 1530 in the greater part of northern Germany, especially in Saxony, Brandenburg, Hesse, Pomerania, Mecklenburg, Lüneburg, Friesland, and in nearly all the free cities, as Hamburg, Lübeck, Bremen, Magdeburg, Frankfort, and Nuremberg; while in Austria, Bavaria, and along the Rhine it was persecuted and suppressed. Among the principal causes of this rapid progress were the writings of the reformers, Luther's German version of the Scriptures, and the evangelical hymns, which introduced the new ideas into public worship. The diet of Spire in 1526 left each state to its own discretion concerning the question of reform until a general council should settle it for all, and thus sanctioned the principle of territorial independence in matters of religion which prevails in Germany to this day, each sover-

eighty having its own separate ecclesiastical establishment and organization in close union with the state. But the next diet of Spire, in 1529, prohibited the further progress of the reformation. Against this decree of the Catholic majority the evangelical princes entered, on the ground of the word of God, the inalienable rights of conscience, and the decree of the previous diet of Spire, the celebrated protest, dated April 19, 1529, which gave rise to the name of Protestants. The diet of Augsburg in 1530, where the Lutherans offered their principal confession of faith, drawn up by Melancthon and named after that city, threatened the Protestants with violent measures if they did not return shortly to the old church. Here closes the first and most eventful period of the German reformation. The second period embraces the formation of the Protestant league of Smalcald for the armed defence of Lutheranism, the various theological conferences of the two parties for an adjustment of the controversy, the death of Luther, the imperial interims or compromises (the Ratisbon, Augsburg, and Leipsic interims), and the Smalcaldian war, and ends with the success of the Protestant army under Maurice of Saxony and the peace of Augsburg in 1555, which secured to the Lutheran states the free exercise of their religion, but with a restriction on its further progress. The third period, from 1555 to 1580, is remarkable for the violent internal controversies of the Lutheran church: the Osiandrian controversy, concerning justification and sanctification; the adiaphoristic, arising originally from the fruitless compromises or interims; the synergistic, concerning faith and good works; and the crypto-Calvinistic or sacramentarian controversy about the real presence. These theological disputes led on the one hand to the full development of the doctrinal system of Lutheranism as laid down in the "Book of Concord" (first published in 1580), which embraces all the symbolical books of that church, namely, the three oecumenical creeds, the Augsburg confession and its "Apology" by Melancthon, the two catechisms of Luther and the Smalcald articles drawn up by him in 1537, and the "Formula of Concord," composed by six Lutheran divines in 1577. But on the other hand, the fanatical intolerance of the strict Lutheran party against the Calvinists and the moderate Lutherans, called after their leader Melancthonians or Philippists, drove a large number of the latter over to the Reformed church, especially in the Palatinate (1560), in Bremen (1561), Nassau (1582), Anhalt (1596), Hesse-Cassel (1605), and Brandenburg (1614). The German Reformed communion adopted the Heidelberg catechism, drawn up by two moderate Calvinistic divines, Zacharias Ursinus and Kaspar Olevianus, in 1562, by order of the elector Frederick III. or the Pious, as their confession of faith. The 16th century closes the theological history of the German reformation; but its political his-

tory was not brought to a final termination until after the terrible thirty years' war, by the treaty of Westphalia in 1648, which secured to the Lutherans and the German Reformed churches (but to no others) equal rights with the Roman Catholics within the limits of the German empire. Those two denominations, either in their separate existence or united in one organization (as in Prussia and other states since 1817), are to this day almost the only forms of Protestantism recognized and supported by the German governments, all others being small self-supporting sects, regarded with little sympathy by the popular mind. But within those ecclesiastical establishments Germany has bred and tolerated during the present century almost every imaginable form of theoretic belief, from the strictest old school orthodoxy to the loosest rationalism and skepticism. Since the third jubilee of the reformation (1817), however, there has been a gradual and steady return from neology to the original evangelical Protestantism. II. THE REFORMATION IN SWITZERLAND. This was contemporaneous with, but independent of, the German reformation, and resulted in the formation of the Reformed communion as distinct from the Lutheran. In all the essential principles and doctrines, except that on the mode of Christ's presence in the eucharist, the Helvetic reformation agreed with the German; but it departed further from the received traditions in matters of government, discipline, and worship, and aimed at a more radical moral and practical reformation of the people. It naturally divides itself into three periods: the Zwinglian, from 1516 to 1531; the Calvinistic, to the death of Calvin in 1564; and the period of Bullinger and Beza, to the close of the 16th century. The first belongs mainly to the German cantons, the second to the French, the third to both jointly. Zwingli began his reformatory preaching against various abuses at Einsiedeln in 1516, and then with more energy and effect at Zürich in 1519. His object was to "preach Christ from the fountain," and to "insert the pure Christ into the heart." At first he had the consent of the bishop of Constance, who assisted him in putting down the sale of indulgences in Switzerland, and he stood even in high credit with the papal nuncio. But a rupture occurred in 1522, when Zwingli attacked the fasts as a human invention, and many of his hearers ceased to observe them. The magistrates of Zürich arranged a public disputation in January and another in October, 1523, to settle the whole controversy. On both occasions Zwingli, backed by the authorities and the great majority of the people, triumphed over his papal opponents. In 1526 the churches of the city and the neighboring villages were cleared of images and shrines, and a simple, almost puritanic mode of worship took henceforward the place of the Roman Catholic mass. The Swiss diet took a hostile attitude to the Reformed movement, similar

to that of the German diet, with a respectable minority in its favor. To settle the controversy for the republic, a general theological conference was arranged and held at Baden, Aargau, in May, 1526, with Dr. Eck, the famous antagonist of Luther, as the champion of the Roman, and Ecolampadius of the Reformed cause. Its result was in form adverse, but in fact favorable to the cause of the reformation. It was now introduced in the majority of the cantons, at the wish of the magistrates and the people; by Ecolampadius in Basel and Haller in Bern, also in part in St. Gall, Schaffhausen, Glarus, Appenzell, Thurgau, and the Grisons; while in the French portions of Switzerland William Farel and Viret prepared the way for Calvin. But the small cantons around the lake of Lucerne, Uri, Schwytz, Unterwalden, Lucerne, and Zug, steadfastly opposed every innovation. At last it came to an open war between the Reformed and Catholic cantons. Zwingli's policy was overruled by the apparently more humane, but in fact more cruel and disastrous policy of Bern, to force the poor mountaineers into measures by starvation. The Catholics, resolved to maintain their rights, attacked and routed the small army of Zürichers in the battle of Cappel, October, 1531. Zwingli, who had accompanied his flock as chaplain and patriot, met a heroic death on the field of battle, and Ecolampadius of Basel followed him in a few weeks. Thus the progress of the reformation was suddenly arrested in the German portions of Switzerland, and one third of it remains Catholic to this day. But it took a new start in the western or French cantons, and rose there to a higher position than ever. Soon after this critical juncture the great master mind of the Reformed church, who was to carry forward, to modify, and to complete the work of Zwingli, and to rival Luther in influence, began to attract the attention of the public. John Calvin, a Frenchman by birth and education, but exiled from his native land for his faith, found providentially a new home in 1536 in the little republic of Geneva, where Farel had prepared the way. Here he developed his extraordinary talents and energy as the greatest divine and disciplinarian of the reformation, and made Geneva the model church for the Reformed communion, and a hospitable asylum for persecuted Protestants of every nation. His theological writings, especially the "Institutes" and "Commentaries," exerted a formative influence on all Reformed churches and confessions of faith; while his legislative genius developed the presbyterian form of government, which rests on the principle of ministerial equality and of a popular representation of the congregation by lay elders, aiding the pastors in maintaining discipline and promoting the spiritual prosperity of the people. Calvin died after a most active and devoted life in 1564, and left in Theodore Beza (died 1605) an able and worthy successor, who partly with Bullinger, the faithful suc-

cessor of Zwingli in Zürich, and author of the second Helvetic confession (1566), labored to the close of the 16th century for the consolidation of the Swiss reformation and the spread of its principles in France, Holland, Germany, England, and Scotland. III. THE REFORMATION IN FRANCE. While the reformation in Germany and Switzerland carried with it the majority of the population, it met in France with the united opposition of the court, the hierarchy, and the popular sentiment, and had to work its way through severe trial and persecution. The tradition in that country was favorable to a change, as France had always maintained a certain degree of independence of Rome, and as the university of Paris, once the centre of European intelligence and culture, had strongly urged a thorough reformation *in capite et membris* on the councils of the 15th century. The first professed Protestants in France were Lefèvre, Wolmar, Farel, Viret, Marot, Olivetan, Calvin, and Beza, all men of distinguished learning and ability; but most of them had to seek safety in exile. It was only after the successful establishment of the reformation in French Switzerland that the movement became serious in the neighboring kingdom. Calvin and Beza may be called the fathers of the French Reformed church. Their pupils returned as missionaries to their native land. The first Protestant congregation was formed at Paris in 1555, and the first synod held in the same city in 1559. In 1561 the theological conference at Poissy took place, where Theodore Beza eloquently but vainly pleaded the cause of the Protestants before the dignitaries of the Roman church, and where the name Reformed originated. In 1571 the general synod at La Rochelle adopted the Gallican confession and a system of government and discipline essentially Calvinistic, yet modified by the peculiar circumstances of a church not in union with the state, as in Geneva, but in antagonism with it. The movement here unavoidably assumed a political character, and led to a series of civil wars which distracted France till the close of the 16th century. The Roman Catholic party, backed by the majority of the population, was headed by the dukes of Guise, who derived their descent from Charlemagne and looked to the throne, then occupied by the house of Valois. The Protestant (or Huguenot) party, numerically weaker, but containing some of the noblest blood and best talent of France, was headed by the princes of Navarre, the next heirs to the throne and descendants of Hugh Capet. The queen regent Catharine, during the minority of her sons, Francis II. and Charles IX., although decidedly Roman Catholic in sentiment, tried to keep the rival parties in check in order to rule over both. But the champions of Rome took possession of Paris, while the prince of Condé occupied Orleans. Three civil wars followed in rapid succession, when the court and the duke of Guise resorted to treason, and concerted a

wholesale slaughter of the Huguenots, Aug. 24, 1572, the leaders of the party having been expressly invited to Paris to attend the marriage of Prince Henry of Navarre with a sister of Charles IX. as a general feast of reconciliation. (See BARTHOLOMEW, SAINT, MASSACRE OF, and HUGUENOTS.) But the party was only diminished in number, by no means annihilated. Other civil wars followed with varying fortune, and terminated at last in the victory of Prince Henry of Navarre, who, after the assassination of Henry III. in 1589 by a Dominican monk, became king of France as Henry IV. This seemed to decide the triumph of Protestantism in France. But the Roman party, still more numerous and powerful, and supported by Spain and the pope, elected a rival head and threatened to plunge the country into new bloodshed. Then Henry, from political and patriotic motives, but apparently not from religious conviction, abjured the Protestant faith, in which he had been brought up, and professed the Roman Catholic religion (1593), saying that Paris and the peace of France were "worth a mass." At the same time, however, he secured to his former associates, then numbering about 760 congregations throughout the kingdom, in spite of the remonstrance of the pope and the bishops, a legal existence and the right of the free exercise of religion, by the celebrated edict of Nantes in 1598, which closes the stormy period of the French reformation. But the Reformed church in France, after flourishing for a time, was overwhelmed with new disasters under the despotism of Richelieu, and finally the revocation of the edict of Nantes by Louis XIV. in 1685 reduced it to a "church of the desert;" yet it survived the most cruel persecutions at home, and enriched by thousands of exiles the population of every Protestant country in Europe and America. IV. THE REFORMATION IN THE NETHERLANDS was kindled partly by Lutheran influences from Germany, but mostly by Reformed and Calvinistic influences from Switzerland and France. Its first martyrs, Esch and Voes, were burned at Antwerp in 1523. The despotic arm of Charles V. and his son Philip II. resorted to the severest measures for crushing the rising spirit of religious and political liberty. The duke of Alba surpassed the persecuting heathen emperors of Rome in cruelty, and, according to Grotius, destroyed the lives of 100,000 Dutch Protestants during the six years of his regency (1567-'73). Finally the seven northern provinces formed a federal republic, first under the leadership of William of Orange, and after his assassination (1584) under his son Maurice, and after a long and heroic struggle accomplished their severance from the church of Rome and the Spanish crown. The southern provinces remained Roman Catholic and subject to Spain. The first Dutch Reformed synod was held at Dort in 1574, and in the next year the university of Leyden was founded. The Protestant-

ism of Holland is predominantly Calvinistic, and adopts as its doctrinal and disciplinary standards the Heidelberg catechism as published (in Latin and German) in 1563, the Belgic confession of 1561, and the articles of the synod of Dort of 1618-'19. This important synod was held in consequence of the Arminian controversy, which violently agitated the country at that time. The Arminians or Remonstrants, differing in five points from the Calvinists, and holding to the freedom of the will and a conditional predestination, were condemned by the synod of Dort, but continued as a tolerated sect, and exerted, through the writings of their distinguished scholars and divines, Arminius, Hugo Grotius, Episcopius, Limborch, and Le Clerc (Clericus), considerable influence upon Protestant theology in England, France, and Germany during the 18th century. The orthodox church of Holland has been represented in the United States since 1609 by the Reformed Protestant Dutch church (now the "Reformed church in America"), the oldest save one of the denominations in the United States. V. THE REFORMATION IN HUNGARY. This country was first brought into contact with the reform movement by disciples of Luther and Melancthon, who had studied at Wittenberg, after 1524. Ferdinand I. granted to some magnates and cities liberty of worship, and Maximilian II. (1564-'76) increased it. The synod of Erdöd in 1545 organized the Lutheran, and the synod of Osenger in 1557 the Reformed church. The German settlers mostly adopted the Augsburg confession, the national Magyars the Helvetic. Rudolph II. having suppressed religious liberty, Prince Stephen Bocskay of Transylvania, strengthened by his alliance with the Turks, reconquered by force of arms (1606) full toleration for the Lutherans and Calvinists in Hungary and Transylvania, which, under his successors Bethlen Gábor and George Rákóczy I., was confirmed by the treaties of Nikolsburg (1622) and Linz (1645). In Transylvania Socinianism also found a refuge, and has maintained itself to this day. VI. THE REFORMATION IN POLAND. Fugitive Bohemian Brethren or Hussites and the writings of the German reformers started the movement in Poland. King Sigismund Augustus (1548-'72) favored it and corresponded with Calvin. The most distinguished Protestant of that country was Jan Laski, or John à Lasco, a Calvinist, who fled from Poland for his faith, was called back by the Protestant nobility, aided by several friends translated the Bible, and labored for the union of the Reformed and Lutherans (died 1560). A compromise between the two parties was effected by the general synod of Sandomir (*Consensus Sandomiriensis*) in 1570; but subsequently internal dissensions, the increase of Socinianism, and the efforts of the Jesuits greatly interfered with the prosperity of Protestantism in that country. The German provinces now belonging to Russia,

Courland, Livonia, and Esthonia, opened likewise the door to the reformation, and adopted the Augsburg confession. VII. THE REFORMATION IN SCANDINAVIA. The reformers of Sweden were two brothers, Olaf and Lars Peterson, or Petri, disciples of Luther, who after 1519 preached against the existing state of the church. Gustavus Vasa, who delivered the country from the Danes and became king in 1523, favored Protestantism from political and mercenary motives; the whole country, including the bishops, followed without much difficulty. He appropriated a large portion of the wealth of the church to meet the expenses of his wars and administration. The synod of Örebro in 1529 sanctioned the reform, and the synod of Upsal in 1593, after a fruitless attempt to reconcile the country to Rome, confirmed and completed it. Sweden adopted the Lutheran creed, to the exclusion of every other, and retained the episcopal form of government in the closest union with the state. It did great service to the cause of Protestantism in Europe, through its gallant king Gustavus Adolphus, in the thirty years' war; and recently the intolerant laws against dissenters have been almost completely abolished. Denmark became likewise an exclusively Lutheran country, with an episcopal form of state-church government, under Christian III. A diet at Copenhagen in 1536 destroyed the political power of the Roman clergy, and divided most of the church's property between the crown and the nobility. The remaining third was devoted to the new ecclesiastical organization. Bugenhagen of Wittenberg was then called to complete the reform. From Denmark the reformation passed over to Norway about 1536. The archbishop of Drontheim fled with the treasures of the church to Holland; another bishop resigned; a third was imprisoned; and the lower clergy were left the choice between exile and submission to the new order of things, which most of them preferred. Iceland, then subject to Danish rule, likewise submitted to the Danish reform. VIII. THE REFORMATION IN ENGLAND. The struggle between the old and the new religion lasted longer and raged more fearfully in England and Scotland than on the continent, and continued in successive shocks even down to the end of the 17th century, for Puritanism was a second reformation; but it left in the end a very strong impression upon the character of the nation, and affected deeply its political and social institutions. In theology English Protestantism was dependent upon the continental reform, especially the ideas and principles of Calvin; but it displayed greater practical energy and power of organization. It was from the start a political as well as a religious movement, and hence it afforded a wider scope to the corrupting influence of selfish ambition and violent passion than the reformation in Germany and Switzerland; but it passed also through severer trials and persecutions. In

the English reformation we distinguish five periods. The first, from 1527 to 1547, witnessed the abolition of the authority of the Roman papacy under Henry VIII. This was merely a negative and destructive process, which removed the outward obstruction and prepared the way for the reform. Henry VIII. quarrelled with the pope on purely personal and selfish grounds, because the pope properly refused consent to his divorce from Catharine of Aragon and his marriage to Anne Boleyn. "The defender of the faith," a title given him by the pope for the defence of the seven sacraments against Luther, remained in doctrine and religious sentiment a Roman Catholic to the end of his life; and at his death the so-called "bloody articles," which enjoined under the severest penalties the dogma of transubstantiation, auricular confession, private masses, and the celibacy of the priesthood, were yet in full force. The only point of radical difference was the royal supremacy. He simply substituted a domestic for the foreign, and a political for an ecclesiastical papacy, and punished with equal severity Protestant as well as Roman Catholic dissenters who dared to doubt his supreme headship of the church of England. But while he thus destroyed the power of the pope and of monasticism in England, a far deeper and more important movement went on among the people under the influence of the revived traditions of Wycliffe and the Lollards, the writings of the continental reformers, and the English version of the Scriptures commenced by Tyndale, carried on by Coverdale and Rogers, and revised by Cranmer. The second period embraces the reign of Edward VI., from 1547 to 1553, and contains the positive introduction of the reformation by the coöperation mainly of the duke of Somerset, protector and regent during the king's minority, and Cranmer, archbishop of Canterbury, who by his pliable conduct and subserviency to the will of Henry had preserved the idea and hope of a reformation through that reign of terror. Cranmer was assisted in the work by Ridley and Latimer, and by several Reformed divines from the continent whom he called to England, especially Martin Bucer of Strasburg, now elected professor at Cambridge, and Peter Martyr of Zürich (originally from Italy), for some time professor at Oxford. The most important works of this period, and in fact of the whole English reformation, next to the English version of the Bible, are the 42 articles of religion (subsequently reduced to 39), or a new and moderately Calvinistic confession of faith, and the "Book of Common Prayer," or a new directory of worship in the vernacular tongue, on the basis of the old Latin service, but with essential changes. The third period is the reign of Queen Mary, from 1553 to 1558, and presents to us the unsuccessful attempt of that queen and her friend Cardinal Pole, now made archbishop of Canterbury after the deposition

of Cranmer, to undo the reformation and to restore the Roman Catholic religion and the authority of the pope. This Catholic interim did more to consolidate the reformation in England than Henry, Edward, and Elizabeth. Hundreds were martyred in this short reign; among them the three British reformers, Ridley, Latimer, and Cranmer, who were publicly burned at Oxford in 1555 and 1556. Many others fled to the continent, especially to Geneva, Zürich, Basel, and Frankfort, where they were hospitably received and brought into closer contact with the Reformed churches of Switzerland and Germany. The fourth period is the restoration and permanent establishment of the Anglican reformation during the long reign of Elizabeth, 1558 to 1603. The Roman Catholic hierarchy was replaced by a Protestant, and the articles of religion and the common prayer book of the reign of Edward were introduced again, after a revision. The ecclesiastical supremacy of the crown was likewise renewed, but under a modified form, the queen refusing the title "supreme head" of the church of England, and choosing in its place the less objectionable title "supreme governor." The convocation and parliament readily sanctioned all these changes; but the Anglican church as established by Elizabeth was semi-Catholic in its form of prelatical government and liturgical worship, a sort of *via media* between Rome and Geneva. It suited the policy of the court and the taste of the majority of the English people, but was offensive to the severer school of strict Calvinists who had returned from their continental exile. Hence the agitation in the bosom of the reformed church of England, and the growing conflict between the Episcopalian majority and the puritanic minority. Elizabeth's reign was as intolerant against Puritan as against papal dissenters, and passed the severest penal laws against both. But while the Catholic party was almost annihilated in England, the Puritan party grew more powerful under the successors of Elizabeth, and overthrew the dynasty of the Stuarts, and even the Episcopalian establishment, although the latter revived from the shock. These troubles and agitations constitute the fifth period in the history of English Protestantism, which in some respects is the most important and interesting, but lies beyond the age of the reformation proper.

IX. THE REFORMATION IN SCOTLAND. The first impulse to the reformation in Scotland proceeded from Germany and Switzerland. Copies of the writings of the continental reformers and of Tyndale's English Testament found their way to the far north. The first preacher and martyr of Protestantism in that country was Patrick Hamilton, a youth of royal blood, and for some time a student at Wittenberg and Marburg, who was condemned to death by Archbishop Beaton and burned at the stake. The movement gradually increased in spite of persecution, especially after the rup-

ture of England with the pope, and was carried to a successful conclusion under the guidance of John Knox. He was a disciple and admirer of John Calvin, with whom he spent several years. He returned after the accession of Elizabeth to his native country, resolved to reform the Scotch church after the model of the church of Geneva. After a short civil war the parliament of 1560 introduced the reformation, and adopted a Calvinistic confession of faith, drawn up by Knox, Spottswood, Row, and others (superseded afterward by the Westminster standards), and prohibited under severe penalties the exercise of the Roman Catholic worship. In 1561 the first "Book of Discipline" was issued, and gave the new church a complete presbyterian organization, culminating in a general assembly of ministers and elders. The mode of worship was reduced to the greatest simplicity, with a decided predominance of the didactic element. When the unfortunate Mary Stuart, of French education, tastes, and manners, and in no sympathy with the public opinion of Scotland, began her reign in August, 1561, she made an attempt to restore the Roman Catholic religion, to which she was sincerely devoted. But her own imprudences and the determined resistance of the nation frustrated her plans, and after her flight to England (1568) Protestantism was again declared the only religion of Scotland, and received formal legal sanction under the regency of Murray.—Among the numerous historians of the reformation, in whole or in part, the following deserve special mention: Sleidan, *De Statu Religionis et Reipublicæ Carolo V. Casare* (Strasburg, 1555); Beza, *L'Histoire ecclésiastique des églises réformées au royaume de France*, &c. (3 vols., Lille, 1580); Burnet, "Reformation in England" (3 vols. fol., London, 1679-1714); Seckendorf, *Commentarius Historicus et Apologeticus de Lutheranism* (3 vols. fol., Leipsic, 1686-'92); Strype, "Annals of the Reformation" (4 vols. fol., London, 1709-'31), and "Ecclesiastical Memorials" (3 vols. fol., 1721), and his lives of Cranmer, Parker, Knox, McCrie, Hetherington, and others; Schröckh, *Christliche Kirchengeschichte seit der Reformation* (10 vols., Leipsic, 1804-'12); Marheineke, *Geschichte der deutschen Reformation* (4 vols., Berlin, 1816-'34); Hottinger, *Geschichte der schweizerischen Kirchentrennung* (2 vols., Zürich, 1825-'7); Ruchat, *Histoire de la réformation de la Suisse* (6 vols., Geneva, 1727); Merle d'Aubigné, *Histoire de la réformation au XVI^e siècle* (5 vols., Paris, 1835-'53), and *Histoire de la réformation au temps de Calvin* (5 vols., 1862-'8; vol. vi., 1875), both works translated into English; the English translation of vol. iv. of Gieseler's *Lehrbuch der Kirchengeschichte* (New York, 1858), valuable for its extracts from original authorities; L. Haüsser, *Geschichte des Zeitalters der Reformation* (Berlin, 1868; English translation, 1874); and George P. Fisher, "History of the Reformation" (New York, 1873).

REFORMATORIES, institutions for the reformation of juvenile offenders, and for the care and correctional education of neglected children. This duty, but recently assumed by the government in most countries, was previously left to the philanthropic efforts of individuals. The oldest and the largest reformatory in the United States is the house of refuge on Randall's island, New York city, which was opened in 1825. (See *New York*, vol. xii., p. 397.) The Boston house of refuge was opened in 1827, that in Philadelphia in 1828, and that in New Orleans in 1847. But these, though supported in whole or in part by grants from the public revenue, were not managed directly by the state. The importance of making juvenile reformatories a part of the public penal system was recognized by Massachusetts in 1848, when the state reform school at Westborough was established. Similar institutions were organized by other states, so that in 1873 not less than 34 reformatories for juvenile offenders were maintained and managed by the states, or largely aided by them, as follows:

NAME OF INSTITUTION.	Where situated.	When opened.	Average number of inmates during the year.
City and county industrial school.....	San Francisco, Cal.....	1858	456
State reform school.....	West Meriden, Conn..	1854	316
Industrial school for girls.....	Middletown, Conn....	1870	75
State reform school....	Pontiac, Ill.....	1871	175
House of refuge.....	Plainfield, Ind.....	1868	200
Reformatory institution (for women and girls).....	Indianapolis, Ind.....	1873	44
State ref. school, boys.....	Eldorado, Iowa.....	1868	145
State ref. school, girls.....	Salem, Iowa.....	1868	11
House of refuge.....	Louisville, Ky.....	1865	161
House of refuge.....	New Orleans, La.....	1847	109
State reform school....	Portland, Me.....	1852	184
House of refuge.....	Baltimore, Md.....	1855	286
House of reformation.....	Rosaryville, Md.....	1873	60
Boston house of reformation.....	Deer Island, Mass....	1827	301
State industrial school for girls.....	Lancaster, Mass.....	1856	121
State reform school....	Westborough, Mass..	1848	289
State reform school....	Lansing, Mich.....	1856	211
House of refuge.....	St. Louis, Mo.....	1854	92
State reform school....	Manchester, N. H.....	1855	101
State reform school....	Jamesburg, N. J.....	1867	153
State industrial school for girls.....	Trenton, N. J.....	1871	25
House of refuge.....	Randall's Island, N. Y.	1825	555
Juvenile asylum.....	New York, N. Y.....	1851	617
Catholic protectory....	West Chester, N. Y....	1863	1,629
Western house of refuge.....	Rochester, N. Y.....	1849	382
Girls' industrial home.....	Lewis Centre, Ohio....	1869	131
House of refuge.....	Cincinnati, Ohio.....	1851	207
Reform farm school....	Lancaster, Ohio.....	1857	430
House of refuge (white department).....	Philadelphia, Pa.....	1828	445
House of refuge (colored department)....	Philadelphia, Pa.....	1850	126
Pennsylvania reform school.....	Allegheny, Pa.....	1854	264
Providence reform school.....	Providence, R. I.....	1850	202
State reform school....	Waterbury, Vt.....	1866	127
Industrial school for boys.....	Waukesha, Wis.....	1860	271
Reform school.....	Washington, D. C....	1870	103

In all, about 100,000 boys and girls have been committed to these institutions. The time of sentence is generally during minority, though in a few states it is for a specified period. The boys and girls are required to learn trades, and to receive secular and religious instruction. The average number of inmates in 1873 was 8,924, of whom 7,743 were boys and 1,481 girls; the average cost of maintaining each inmate in 1872 was \$152; the average earnings of each were \$37; average stay in the institution, 1 year and 11 months for the boys and 3 years and 4½ months for the girls; considered reformed, 73 per cent. of those discharged. Where necessary, those discharged are provided with homes or employment, or indentured; and in some cases they are liberated on probation. Fifteen per cent. of those detained in 1873 had been vagrants, and 39 per cent. truants.—The reformatory system of Great Britain has been under the control of the government for but a comparatively brief period. The work of reforming juvenile delinquents was begun as early as 1788 by the philanthropic society, which founded the first English reform school near London. Similar institutions were established in London and elsewhere; that in Warwickshire, opened in 1818, was the first in which farm and outdoor labor was made a part of the training of the inmates. In 1838 an act was passed for the establishment of a separate prison at Parkhurst, Isle of Wight, for offenders under the age of 16 years. The discipline here was intended to be specially educational and reformatory. The greatest reformatory in England is that established at Redhill, Surrey, under the direction of Sidney Turner. It was modelled after the famous colony of Mettray in France, and is conducted on the principles of domestic management, absence of walls and wardens, and outdoor labor. Similar institutions were soon afterward opened at Hardwicke in Gloucestershire, near Birmingham, at Bristol, and in Hampshire. In 1854 the secretary of state was empowered to license reformatory schools in Great Britain approved by him, and to make an allowance for the maintenance of the young offenders committed to them. Certain courts and magistrates were authorized to commit to such institutions juveniles under 16 years of age for not less than two nor more than five years. At the same time provision was made for the establishment of industrial schools in Scotland for destitute and vagrant children under 14 years of age. An industrial schools act was passed for England in 1857, and in 1861 industrial schools in both England and Scotland were placed under the home office, with provision for an allowance from the treasury for their maintenance, similar to that given to reformatory schools. Reformatories are intended for correction, and industrial schools for prevention. Only those boys and girls are sent to a reformatory who have been convicted of some offence punish-

able by imprisonment or penal servitude, and who have been committed to jail in the first instance for not less than 10 days; they must be between 10 and 16 years of age, unless previously convicted or sentenced by a superior court. Industrial schools are for destitute and vagrant children under 14 years of age; they are sent directly to the institution, and do not pass through the jail. Children under 12 years of age, guilty of any petty offence, may also be sent to them instead of being committed to prison and a reformatory. Reformatories or industrial schools may be established in connection with any religious organization. The number of reformatories in Great Britain on Jan. 1, 1873, was 65, of which 45 were for boys and 20 for girls. The total number of inmates at that date comprised 4,424 boys and 1,151 girls. The number of certified industrial schools was 100, in which were 7,598 boys and 2,587 girls, besides 720 children who were under detention.—In France the establishments for the correctional education of juvenile delinquents receive boys and girls 16 years of age and under. The penitentiary colonies and correctional colonies are for boys. To the former are sent: 1, children acquitted as having acted without knowledge, but who are not sent back to their parents; 2, young prisoners sentenced for more than six months and not exceeding two years. Some of these are public institutions, founded and directed by the state; others have been established and are managed by individuals with the authorization of the government. The correctional colonies, which are all public, receive young prisoners sentenced for more than two years, and those from the penitentiary colonies who have been declared insubordinate. A similar classification is made for girls, for whom there are 20 establishments, of which one is directed by the state. There are 82 establishments for boys, including 3 public colonies, 4 correctional wards, and 25 private colonies. The most successful of the French reformatories for boys is the agricultural colony at Mettray, five miles from Tours. (See METTRAY.) The principles of family groups and agricultural labor were copied from the Rauhes Haus, near Hamburg, which was established by Dr. Wichern in 1833, and has long been one of the most noted institutions of the kind in Europe.—Belgium has a highly successful institution for the reformation of juveniles, not criminals, but vagrants, truants, street beggars, &c. It comprises three different schools, two for boys and one for girls; the former are at Ruysselede and Wynghene, within sight of each other, and the latter is at Beernem, two or three miles distant. The chief occupation of the boys is farm work, though during the winter they are employed in a variety of trades. The girls are engaged chiefly in lace making, sewing, and laundry work. This institution is noted for the class of neglected children it is intended for, and is self-sustaining.

REFORMED CHURCH. The Protestants on the continent of Europe were divided, about the middle of the 16th century, into two main bodies, known as the Lutheran church and the Reformed church. Though these designations are insufficient to include all the subsequent divisions and sects, yet they mark two distinct types of theology and polity, which have been ever since perpetuated. The so-called Reformed churches are those nurtured under the influence of what is popularly known as the Calvinistic system. This system is contrasted with Lutheranism in several marked particulars. Its keynote is in the doctrine of the divine sovereignty, held not as a philosophical speculation, but as a religious tenet. Luther indeed agreed with Calvin, using even stronger forms of statement, as to the servitude of the fallen human will, and the doctrine of election. But the Lutheran theology, under Melancthon's influence, and in the *Formula Concordiæ*, renounced the decree of unconditional election; nor did its divines defend the supralapsarian scheme. Another theological difference was upon the theory of the Lord's supper. Luther, though denying transubstantiation, affirmed a supernatural union of the body and blood of Christ with the consecrated elements, and advocated a literal interpretation of the words, "This is my body," holding to the real presence of Christ in the eucharist, in such a sense that the communicant, worthy or unworthy, actually receives the body of Christ into the mouth, "in, with, and under the form of the bread." The Lutheran divines asserted the ubiquity, though not in the common sense, of Christ's body, resulting from the union of the divine and human natures in his person. Calvin, on the contrary, maintained the real presence of Christ in the supper only in a spiritual sense, and a spiritual reception on the part of the communicant, the body of Christ meanwhile remaining in heaven, and imparting its virtue by a wonderful spiritual process. (See Julius Müller, *Lutheri et Calvini Sententiæ de Sacra Cœna inter se comparatæ*, Halle, 1858.) But in contrast with Zwingli, Calvin held that the sacraments were seals and pledges, and not merely signs, of divine grace. Montesquieu says that the Lutheran and Reformed communions each believed itself to be most perfect: "The Calvinists believe themselves to be most conformed to what Jesus has said, the Lutherans to what the apostles have done." "The Calvinists," says Schweizer, "contended against the paganism of Rome, and the Lutherans against its Judaism." The latter have been more practical, the former more speculative; the one communion most absorbed in the reconciliation of sovereignty with free will, the other most devoted to the problem of the relation of the divine to the human, especially in the person of Christ. The Lutheran paid more deference to tradition, the Calvinist relied more on the exclusive authority of Scripture, often not distin-

guishing between the Old and New Testaments. Both adopted the presbyterian polity; but the Lutherans insisted more on the territorial rights of princes, while the Reformed emphasized the rights of the people.—The Reformed movement began in Switzerland, under the lead of Zwingli, the hero of Zürich, as early as 1516; in Basel it was headed by Ecolampadius; Geneva was aroused by the intrepid Farel, and taught and organized by Calvin, who came thither, a refugee from France, in 1536. Switzerland was revolutionized by a grand popular movement. The same form of faith was planted in the Palatinate, where was formed the German Reformed church, under the elector Frederick III., combining the spirit of Melancthon with that of Calvin. It was accepted in Bremen, 1561-'81; in Nassau, 1582; in Anhalt, 1596; in Hesse-Cassel, 1605; and even the elector of Brandenburg, John Sigismund, adopted it in 1614. Its churches were also scattered in Bohemia, Hungary, and Poland. The first reforms in Spain and Italy, soon suppressed, were nourished in part under its teachings. In France it attained such vigor that in 1559 a general synod was formed at Paris, and its churches numbered about 2,000. But here they were decimated by religious wars, and by the massacre of St. Bartholomew's, 1572, and enfeebled by the abjuration of Protestantism by Henry IV. The revocation of the edict of Nantes, Oct. 22, 1685, deprived 2,000,000 French Protestants of their religious security, and drove out half a million into all parts of Europe and America before the close of the century. The Reformed system was also introduced into Holland, where the reformation found martyrs as early as 1523. The fierce struggle of the United Netherlands with Philip II. of Spain (1555-'98) was both for civil and religious freedom. The peace of Westphalia in 1648 confirmed the rights and liberties of the Dutch church. In England the reformation at first advanced more slowly. Crammer gave it shape, mainly in the sense of the Reformed symbols, under Edward VI. The persecutions under Mary sent the most ardent of England's reformers to Zürich and Geneva, whence they brought back the seeds of Puritanism. But the Anglican church, though allied to the Reformed faith in its articles of religion, retained the episcopate, and in its prayer book taught the elements of the sacramental system. The act of uniformity (1559) led to a strong Puritan resistance; and the conflict passed over into the 17th century, coming to its height in the civil war of 1642-'9, and the beheading of Laud and of King Charles. But the success under Cromwell was of short duration; and the strength of the Reformed influence was removed from England to America. In Scotland it was firmly established under Knox's influence after his return from the continent in 1559, and organized by the "Solemn League

and Covenant;" and this land has never swerved from its loyalty to the faith of Geneva. In the form of Congregationalism, the same system of faith was transplanted to the new world by the pilgrims who landed on Plymouth rock, and by large subsequent immigrations; in the form of Presbyterianism (including the German and Dutch Reformed churches), it was established in the middle and southern colonies by emigrants from Scotland, Ireland, England, and Holland; and at no period since has it ceased to exert a strong and vital influence upon the principles and history of this country. The Baptist churches of England and America adopt in the main the same system of faith. In other parts of the world, by colonization and emigration, the Reformed church is also widely diffused.—In correspondence and harmony with this wide geographical diffusion, the Reformed church has also shown great productive power in respect to confessions of faith and systems of theology, which, while retaining the same essential features, have set forth different types of doctrine. In this respect it is distinguished from the Roman Catholic and the (orthodox) Lutheran communions. At the very beginning of the Reformed movement we find Zwingli and Calvin differing in their modes of expounding the common faith, the former resolving original sin into a natural defect, and cultivating theology more in the spirit of the man of letters. Even in Switzerland, besides the stricter traditional and scholastic method, exemplified by Heidegger, and brought to its consummation in Turretin, Stapfer also taught, in his able "Polemics," the mediate and not exclusively immediate imputation of Adam's sin. The famous school of Saumur in France, under the impulse of the Scotchman Cameron and the guidance of Amyraut, abandoned the dogma of a limited atonement in favor of the scheme of a hypothetical universalism of divine grace. But the most fruitful seminary of these Calvinistic systems in the 17th century was Holland. Its divines were at first divided between the supralapsarian and the infralapsarian schemes. The great Arminian controversy led to the convocation of the synod of Dort, 1618-'19, at which representatives attended from the English church as well as from other reformed communions; and where, against the Remonstrants, the five points of Calvinism were articulately defined, viz.: 1, unconditional election; 2, particular redemption; 3, total depravity; 4, grace irresistible; 5, the perseverance of the saints. Three prominent types of theology were represented in the subsequent religious development in the Netherlands: 1, the scholastic, advocated by Maresius, Wendelin, Gomarus, and Voetius; 2, the federal theology, or the theology which takes the idea of covenants as its central conception, which received its fullest exposition in the works of Cocceius and Witsius, modifying the rigidity of the scholastic formulas by

a more Biblical and historical method; and 3, the Cartesian type, which made use of the principles of the philosophy of Descartes to expound and vindicate the Christian system, and rendered good service in giving a more systematic form to natural theology as the logical basis of revealed theology, and in the attempt to harmonize the rights of reason with the demands of faith. The Reformed theology of the Palatinate found its best expression in the Heidelberg catechism (1563) drawn up by Ursinus and Olevianus, and adopted as a symbol by the German Reformed and Dutch churches. In England, Scotland, and America this system of faith is expressed in the Westminster confession of faith and catechisms, adopted by the long parliament in 1646, by the kirk of Scotland in 1647, by the Cambridge synod of New England in 1648, and by the Presbyterian church of America in 1729. The subsequent divisions in the Scotch church were chiefly upon the question of the relation of the church to the civil power (Associate presbytery, 1733; Covenanters, 1743; Burghers and Anti-Burghers, 1747; Relief Secession, 1761). In the "marrow controversy" (Fisher's "Marrow of Modern Divinity") five propositions were condemned in 1720, which were supposed to have an Antinomian tendency. The Scottish orthodoxy was upheld in the last half of the 18th century by Erskine, Hill, and others; though somewhat enfeebled by the lukewarmness of the Robertson administration, 1758-'82. It has been revived in the present century, chiefly through the zealous advocacy of Chalmers. In the Anglican church there have always remained some able advocates of the fundamental principles of the Reformed system, as Davenant, Leighton, Ezekiel Hopkins, and John Edwards; but it has chiefly flourished among the nonconformists of England, represented by such men as Thomas Watson, Baxter, Owen, Howe, Ridgeley, Matthew Henry, and Isaac Watts, not to name men of later date. In the writings of Tobias Crisp it is Antinomian in its tendency.—Nearly contemporaneous with the decline of the Calvinistic system in its productive vigor upon the continent of Europe, was the rise of its most elaborate and philosophical defender in our own land, in the person of the elder Edwards. (See EDWARDS, JONATHAN.) He stands at the head of a school, that of the so-called New England theology, which may well vie with any European type of this system in ingenuity, comprehensiveness, and moral vigor. Denying a limited atonement, insisting upon the distinction between natural ability and moral inability, making the essence of virtue to consist in holy love, and opposing the dogma of immediate imputation, it has exerted a prevailing influence upon the tone of theological speculation, and borne permanent fruits in the writings of Bellamy, Hopkins, Smalley, the younger Edwards, and Emmons. The later representatives of the Reformed dogmatics upon the continent of Eu-

rope, as Schleiermacher, Ebrard, Schneckerburger, Schweizer, and Vinet, have advocated it in a historical and philosophical, rather than a traditional and scholastic spirit.—In estimating the influence of this system, we ought not to pass unnoticed the fact that a large portion of the denominations and sects of modern Christendom have sprung into being from its impulse, or in opposition to it. This was the case with the Arminians; in part also with the Unitarians of Poland, Transylvania, England, and New England; with the Baptists in their various ramifications; and with the Wesleyans or Methodists of England and America. The Reformed church has been fruitful in sects. The Lutheran church of Europe has always been under bonds to the state; the Reformed churches have more frequently claimed their own rights, and demanded a relative independence. The presbyterian polity was essentially a representative system; its lay elders (chosen for life in Scotland and Geneva, and for a limited period in Holland, France, and Germany) gave it vitality. Its presbyterial and synodal constitution, aristocratic in France and Geneva, and more democratic in Holland and Scotland, has made it efficient. It has also been zealous in administering discipline. The power of the laity was still further enhanced in the congregational or independent form of polity, so largely adopted in England by the nonconformists, including the Baptists, and prevalent in New England. Thus fitted to be a working church, it has in most of its branches been zealous in domestic and foreign missions, and has led the way to the progressive reforms that characterize modern society.

REFORMED (DUTCH) CHURCH IN AMERICA (formerly REFORMED PROTESTANT DUTCH CHURCH), a religious body which arose in the Netherlands early in the 16th century, and attained its form and organization during the struggle against Philip II. under the leadership of the princes of Orange. For a long time those who embraced the evangelical doctrines could worship only with the utmost privacy, and they denominated their assemblies "the churches of the Netherlands under the cross." In 1561 a confession of faith was published by Guido de Bres, called the Belgic confession, modelled after that of the Calvinistic church of France. It was adopted by the first synod held in 1568 at Wesel on the Rhine. Public field preaching was introduced about the same time, and also singing in the native language. Churches were formed after the Genevan presbyterian model, and at the synod of Wesel rules of church order were adopted, and the scattered churches were organized as one body. Soon afterward the yoke of Spain was formally thrown off by the provinces, and the Protestant faith became the religion of the state. In the early part of the 17th century the famous Arminian controversy distracted the church. Arminius, professor of theology in the university of Leyden, advanced sentiments which

were thought by his colleague Gomarus to be at variance with the standards of the church. A controversy arose, in which ministers and church members throughout the country took sides, the larger portion by far sympathizing with the Gomarists, while those who were high in political power for the most part favored the Arminians. In a remonstrance to the states, the views of the Arminians on the famous five points of predestination, redemption, depravity, conversion, and perseverance were defined. From this paper they were called Remonstrants, and their opponents were from their reply called Contra-Remonstrants. The Contra-Remonstrants urged the call of a national synod to decide on the new opinions, and the Remonstrants opposed it. The former contended for the independence of the church in matters of discipline; the latter deferred much to the authority of the civil government. At length, after a protracted controversy under the stadtholder Maurice, a national synod met at Dort in 1618, and continued in session six months. By it the doctrines of the Remonstrants were condemned, and those who had taught them were deposed from the ministry and deprived of all ecclesiastical and academical offices. The decision of the synod was followed by the action of the states forbidding all assemblies of the Remonstrants, and banishing many of the deposed ministers. The Remonstrants were afterward tolerated, and have continued as a small sect in the Netherlands, while their doctrines have spread widely into other countries. By this last national synod of the church in the Netherlands her doctrines and order were finally settled. Through the remainder of the century she was greatly prospered, was zealously carried into all the Dutch colonies east and west, and was known especially for her tolerant spirit. The church and republic of the Netherlands furnished an asylum for the oppressed of every creed and nation. Of late, however, the ministers and members of the national church have to a great extent departed from the evangelical doctrines of the standards, and rationalistic and Socinian ideas greatly prevail among them.—The church was introduced into America early in the 17th century. The first permanent agricultural settlement in New Netherland was made in 1623, and soon the colonists enjoyed the services of two *krankbesoekers* or consolars of the sick, who were officers of the church, and whose duty it was to visit and pray with the sick, and conduct public worship in the absence of a minister. These read the Scriptures and creeds to the people assembled in an upper room over a horse mill. In 1628 the Rev. Jonas Michælius arrived at Manhattan, organized a consistory, administered the sacraments, and performed all the functions of the ministry. He was succeeded in 1633 by the Rev. Everardus Bogardus, who was accompanied by the first schoolmaster, Adam Roelandsen. Bogardus

married the widow Annetje Jansen, whose farm has now become the valuable property held by the corporation of Trinity church. In his time a plain wooden building was put up for worship in Broad street, between Pearl and Bridge. The second building was erected under the administration of Director Kieft in 1642, and stood within the walls of Fort Amsterdam on the Battery. After the surrender of New Amsterdam to the English in 1664, this church was used by the military chaplains when not occupied by the consistory; and after the Dutch people removed into their new edifice in Garden street, it was used by the English garrison for worship down to 1741. Public worship was commenced at Albany perhaps as early as at New Amsterdam, but the first minister there of whom we have knowledge was Johannes Megapolensis, who soon after his arrival in 1643 preached the gospel to the Indians who came to Fort Orange to trade. During the Dutch rule churches were also established at Esopus (Kingston, N. Y.), Flatbush and Flatlands, and Brooklyn. New Amsterdam at the time of its surrender contained only about 1,500 inhabitants, and in the entire province of New Netherland there were five churches and six ministers. From that time until recently the progress of the church in America has been necessarily slow, for the following reasons: 1. The emigration from the Netherlands almost entirely ceased, and many families, willing to live only under their native government, returned to the Netherlands. 2. Government patronage was removed on the transfer of the province to the British and the introduction of the English church, to which church also advantages were given amounting to its virtual establishment by law in New York, Westchester, Queens, and Richmond. 3. The Dutch language was used exclusively in worship down to the year 1763; consequently the church could not gather within her fold those who used another language, nor extend herself to new settlements. Meanwhile the English language was used in schools and in public business, and had at last become the prevailing and popular tongue. Although English preaching was introduced in 1763, the Dutch continued to be the prevailing language in the various pulpits down to the present century, but after that it rapidly gave way to the English, and now is no more heard in public worship, save in the churches composed of recent emigrants from Holland. The minutes of the general synod began to be kept in English in 1794. 4. The church suffered from a deficiency of ministers, and the obstacles that were in the way of obtaining a supply. She had no educational institutions, and no church judicatory with power of ordination; her ministers all belonged to the classis of Amsterdam, and to that classis she applied for ministers, and to it she sent her candidates to receive ordination. By these means the congregations were often subjected

to great delay and expense. Then arose the noted *coetus* and *conferentie* controversy. The *coetus* was a body formed in 1747, which possessed no ecclesiastical, but only advisory powers. From this sprang the *coetus* party, who proposed that this assembly should be changed into a regular classis, that an educational institution should be established, and that the church should thus boldly undertake to supply herself with a ministry. This was opposed by the *conferentie*, who zealously advocated a continuance of the state of dependence on Holland. At last, through the agency of the Rev. John H. Livingston, D. D., the breach was healed, and in 1771 an independent church organization was effected. A convention of ministers and elders met in New York in October of that year, by which three objects were secured: 1, the internal arrangement and government of the churches, embracing the organization of superior church judicatories and measures for the establishment of a professorship of theology; 2, healing of dissensions; 3, correspondence with the church in Holland. The acts of the convention were soon followed by the approbation, good wishes, and prayers of the classis of Amsterdam. The church in Holland made it an express condition of the independence of the church in America that she should at once initiate measures for the training of a learned ministry. The classis of Amsterdam was therefore petitioned to send over a professor of theology, but instead of this they recommended the appointment of Dr. Livingston. On account of the breaking out of the revolutionary war, his appointment was delayed till 1784. During the war the congregations in New York were scattered, the houses of worship desecrated, and of the four pastors, three never returned to their field of labor. The church now completed her organization by the formation of a general synod, which at first met triennially, but after 1812 annually. A constitution, compiled by Drs. Livingston and Romeyn from the acts of the synod of Dort, and adapted to the church in this country, was adopted. In 1770, through efforts of the *coetus* party, a charter had been obtained for a college, to be called Queen's, which was established at New Brunswick, N. J. A chief object of this college was, as its charter declares, to prepare young men for the ministry of the Reformed Dutch church, and it was required that its president should be a member of that church. From fear of awakening old prejudices, the professorship of theology was kept separate from the college till 1810, when Dr. Livingston removed to New Brunswick, and in addition to his professorship held the office of president of Queen's college. In 1825 the college, whose exercises had for some years been suspended, was revived under the name of Rutgers, and a new covenant was framed between the synod and board of trustees. (See **NEW BRUNSWICK, and RUTGERS COLLEGE.**)—Members of the Dutch church coöperated in

1793 with many from other churches in forming the New York missionary society. Ministers were also sent on missionary tours to Kentucky and Canada, and some churches were established, but by reason of distance and inherent weakness they were soon lost. The efforts at extension were afterward mainly directed to western New York, and about the year 1830, when the present board of domestic missions was organized, a number of important posts were occupied. In 1836 missions to the western states were commenced. At present there are 76 churches in the western states, of which a large number are composed of emigrants from Holland. There are no churches in New England, and none south of Philadelphia. Five sixths of the churches are in the states of New York and New Jersey. Two thirds of all the churches in the connection have been organized within the past 50 years, and during that time the ministry has increased more than fourfold. In 1817 the general synod coöperated with the Associate Reformed and Presbyterian churches in the formation of the united foreign missionary society, which in 1826 was merged in the American board of commissioners for foreign missions. In 1832 the synod made an arrangement with the American board, under which in 1836 a band of missionaries went forth from the Dutch church destined for the Dutch East Indies. Stations were begun on the island of Borneo, and soon a part of the band was sent to establish a mission at Amoy in China. On account of a diminution of the numbers of the missionaries and a lack of reinforcements, the stations in Borneo were after a few years abandoned. The missionaries at Amoy have been eminently successful. In southern India are several churches forming the classis of Arcot, which at first were ministered to by five sons of the Rev. Dr. John Seudder. The arrangement with the American board continued in force till 1857, when an amicable separation was effected, and the missions of Amoy and Arcot were transferred to the Reformed Dutch church. In 1859 missionaries were sent to Japan, where they have done an admirable work, especially in education. Mission work is also to a limited extent conducted among the Indian tribes in the far west. Besides the boards of domestic and foreign missions, the general synod established a board of Sabbath school union, which has since been abolished; a board of education for the aid of pious indigent young men in preparing for the ministry; a board of publication, which aims to spread a sound religious literature; a relief fund for the aid of disabled ministers and the families of deceased ones; and a fund for church extension.—In 1822 the Rev. Solomon Froeligh, D. D., of Hackensack and Schraalenburgh, N. J., and a few other ministers, seceded with their congregations from the Dutch church, on the alleged ground of a prevailing laxness in doctrine and discipline, and organized the "True

Reformed Dutch church." It has only a few congregations.—The doctrinal standards of the church are: 1, the Belgic confession of faith; 2, the Heidelberg catechism; 3, the canons of the synod of Dort. The Belgic confession of faith was published in 1561, and adopted as a standard by the synod of Wesel in 1568. This was the basis of the organization of the Reformed church in the Netherlands, and in its 37 articles presents a complete systematic view of the doctrines of the reformation. The Heidelberg catechism was received about the same time. It had been composed by order of the elector Frederick III. for the Palatinate, by Ursinus, a professor in the university of Heidelberg, and Olevianus, a court preacher. It was intended by the elector to be a harmonizing symbol of faith, to be received by both the Lutherans and Reformed in his dominions. The church in the Netherlands heartily adopted it, divided it into 52 Lord's days, and ordered that it should not only be taught to the youth, but expounded once in the course of every year from the pulpit. The canons were adopted by the synod of Dort in 1619, and framed with special reference to the five points of the Arminians which were condemned by that synod. In the church of the Netherlands, forms of prayer were at first used in ordinary public worship in connection with extemporaneous prayers. Such forms are now found in the liturgy of the Reformed church in America, but their use, though allowed, is not enjoined. Practically they are regarded as directories for the performance of that part of the service. There are other portions of the liturgy the use of which is made obligatory by the constitution, viz., forms for the administration of the sacraments, for the ordination and installation of ministers, elders, and deacons, and for the excommunication and readmission of members. This liturgy in its essential parts was composed for the church in London in 1551 by Jan Laski or John à Lasco, who used the labors of Calvin, Polanus, and others. This church in London was composed of Protestant refugees from Germany and the Netherlands, who in Britain under the reign of Edward VI. found an asylum from persecution. Driven back to the continent on the accession of Mary, they carried their liturgy with them. It was rearranged by Dathenus and adopted substantially by the synod of Wesel in 1568. It was afterward revised and confirmed by the synod of Dort. The English translation now in use in this country was first published by the consistory of the collegiate church of New York in 1767. In 1853 a movement was made for the revision and amendment of the liturgy. This subject was under consideration till 1858, when it was decided that no alterations should be made. The synod of 1874 adopted a revised liturgy, the use of which is optional. The prescribed order of public worship in the morning is as follows: 1, after a space for

private devotion, invocation; 2, salutation; 3, reading the ten commandments or some other portion of Scripture, or both; 4, singing; 5, prayer; 6, singing; 7, sermon; 8, prayer; 9, collection of alms; 10, singing; 11, benediction. In the other services the reading of the commandments is omitted, and the last service is always to be concluded with the doxology. Formerly the apostles' creed was recited, and a clerk (*voorlezer*), who was also chorister, conducted the opening services from his desk below the pulpit by reading the commandments and a chapter, and announcing and leading in the singing of a psalm. The minister had an hour glass standing on the pulpit, to measure the time to be occupied by the sermon, which was recommended not to exceed an hour. On some part of every Sabbath a portion of the Heidelberg catechism was expounded. Children were almost universally baptized, and provision was made for their instruction in Christian doctrine by parents, church officers, and schoolmasters. The school was an appendage of the church, taught by a schoolmaster appointed by the consistory, and was constantly visited by the minister and elders. The school came with the church into this country, but the continued connection became in time impracticable. Interest has lately been reawakened in this subject, and parochial schools have been established in some congregations. In public worship only such psalms and hymns are sung as have been recommended by the general synod. Singing in the English language was introduced in 1767. In 1813 the Rev. Dr. Livingston, by order of the general synod, compiled the "Book of Psalms and Hymns" now in use, to which large additions of hymns have been made. Another book called "Hymns of the Church," with tunes, was authorized in 1869, and is in use in many of the churches. The observance of the principal feast days, as Christmas, Easter, Ascension, and Whitsuntide, was denounced by the early synods in the Netherlands; but as it was found that the people would otherwise devote them to their pleasures, it was afterward ordained that public worship should be conducted on them. In accordance with this they were for a long time carefully observed by the church in America, nor has respect for them ceased in some of the congregations to this day.—The government of the church is according to the Genevan presbyterian model. The officers are ministers, elders, and deacons, to whom may be added professors of theology. The elders have in connection with the ministers the spiritual oversight of the church. They receive, watch over, dismiss, and discipline members. The board of elders corresponds to the session in the Presbyterian church. The deacons collect and administer alms. The minister, elders, and deacons, or the elders and deacons if there be no minister, compose the consistory, to which the government of the individual church belongs.

In the great majority of cases they are also the trustees to whom the management of the temporalities is committed. The elders and deacons are elected on the organization of a church by the male communicants, and subsequently either by the consistory or the communicants, and in both cases their names are published to the congregation for approval. They hold office for two years, at the expiration of which term they may be reelected. The classis corresponds to the presbytery in the Presbyterian church, and is composed of ministers, with elders delegated, one from each church within a certain district. The classis is a court of appeal from the judicial decisions of consistories. It approves of calls, dissolves pastoral connections, and ordains and deposes ministers. The particular synods, of which there are four, New York, Albany, New Brunswick, and Chicago, are delegated bodies composed of four ministers and four elders from each classis within the bounds of the synod. These are courts of appeal from the decisions of the classes; they form new classes, and transfer congregations from one classis to another. The general synod is the highest court of appeal, and is composed of three ministers and three elders from every classis in the connection. In a few instances of large classes, four ministers and four elders are delegated. It constitutes particular synods, appoints theological professors, has the management of the theological seminary and the various boards, and exercises a general supervisory power over the concerns of the church. It cannot alter or amend the constitution of the church, but may recommend alterations, which can be adopted only by the votes of a majority of the classes. At a meeting of the general synod held at Geneva, N. Y., in June, 1867, it was voted to drop the word Dutch from the corporate name of the body, it being alleged that many were repelled by this foreign designation from joining the church. The question was submitted to the classes, assented to, and the action completed at an extra session of the general synod in Albany, N. Y., Nov. 20 of the same year. A revised constitution was adopted in 1874. The reports of 1874 give the following statistics: particular synods, 4; classes, 34; churches, 489; ministers, 520; communicants, 69,149; contributions, \$276,464. "The Christian Intelligencer," which is devoted to the interests of the church and mainly supported by its members, is the oldest religious weekly in the city of New York next to the "New York Observer," having been established in 1828. The boards publish a semi-monthly paper called the "Sower and Gospel Field." There are two theological seminaries, one at New Brunswick, N. J., the other in connection with Hope college at Holland, Mich., the professors of which are appointed and the course of studies prescribed by the general synod, and which all students in theology contemplating entrance into the ministry of this church are by the con-

stitution required to attend. Much has been done recently for the completion of the endowment of the seminary at New Brunswick, and for furnishing it with the necessary buildings and library. The James Suydam hall contains a gymnasium, chapel, museum, and lecture rooms. The Gardner A. Sage library is a spacious fire-proof building. Many thousands of dollars have been contributed by various friends of the church for books, by the expenditure of which a theological library will be secured second in value to none in the country.

REFORMED CHURCH IN THE UNITED STATES (formerly GERMAN REFORMED CHURCH IN THE UNITED STATES OF AMERICA), a religious body which is an offshoot of the Reformed church of Germany. The first minister was the Rev. George Michael Weiss, who, aided by the classis of Amsterdam, emigrated with about 400 people of the Palatinate in 1727. They settled along the Skippach, in Montgomery co., Pa., and built a wooden church. The majority of the immigrants who followed these pioneers settled in Pennsylvania, E. of the Susquehanna; smaller numbers settled in New York, along the Hudson, in New Jersey, Maryland, and Virginia, and even extended into the Carolinas. But though the members of the church were soon counted by thousands, no effort was made to establish an ecclesiastical organization, and until the middle of the century the number of ministers was at no time more than three or four. In 1746 the Rev. Michael Schlatter was commissioned by the synods of North and South Holland to visit their German missions in America, and to regulate their ecclesiastical relations. After visiting all the German congregations, he assembled in Philadelphia the first synod (or, as it was then called, *coetus*) of the German Reformed church, Sept. 29, 1747. It consisted of 31 members, 5 ministers and 26 elders, who represented 46 churches and a population estimated at 30,000. Schlatter not only organized the church, but greatly promoted its growth by inducing clergymen in Germany to come as missionaries to America, and by collecting in England, Holland, Germany, and Switzerland a large fund for the support of ministers and teachers. The German Reformed *coetus* continued under the jurisdiction of the synod of Holland, sending its acts and proceedings to it for revision, till 1793, when it resolved to assume the right of self-government. It adopted a constitution, entitled *Synodal-Ordnung der hochdeutschen Reformirten Synode und der mit ihr verbundenen Gemeinden in den Vereinigten Staaten von Nord-Amerika* ("Constitution of the High German Reformed Synod and of the congregations connected with it in the United States of America"). The church, which was called High German in distinction from the Low German or Dutch, had at this time at least 150 churches, but only 22 ordained ministers. It increased rapidly in membership and congregations, but as the influx of clergymen who

had received their education at European universities ceased, and as the church had as yet no theological school of its own, the standard of ministerial education was considerably lowered. Here, as in the Reformed church of Germany, there was a general indifference to the original faith of the church, as embodied in the Heidelberg catechism. A reaction against this indifference began about 1815, and in 1820 the synod enjoined on all ministers to use no other book but the Heidelberg catechism in the instruction of youth preparatory to confirmation. The first theological seminary of the church was opened at Carlisle, Pa., in 1825. It was removed to York in 1829, to Mercersburg in 1835, and to Lancaster in 1871. In 1830 a high school was opened at York, which in 1835 was also removed to Mercersburg, and in 1836 received the name of Marshall college. In 1853 it was united with Franklin college at Lancaster. The first religious paper in English was established in 1828, the first German in 1836. Church boards for missions and beneficiary education were also organized. The German language, in which, with only two or three exceptions, all the pastors had conducted public worship till 1825, began in some districts to give way to the English, a transition which caused no little dissension and confusion, but was finally accomplished. The spread of the English language and the establishment of theological and classical schools led to a closer connection with other Protestant churches of the United States; and many ministers and congregations, chiefly those using the English language, showed a tendency to abandon some peculiar customs of the church, as catechization, confirmation, and the observance of great festivals, and to assimilate their church to the other Protestant denominations. But a powerful counter movement set in, which received its first impulses from the philosophical teachings of Dr. Rauch, first president of Marshall college, and found its ablest and most influential expounder in Dr. John Nevin. The controversy was long and animated. The organism of the church underwent considerable changes. In 1819 the constitution had been revised and amended. The territory was divided into classes (corresponding to the presbyteries of other churches), and the synod, instead of being a convention of all the ministers and one lay delegate from each parish, became a delegated body of ministers and elders elected by the classes. In 1824 the classes of Ohio became an independent body, assuming the name of the "Synod of Ohio," which in 1837 was changed into "Synod of Ohio and Adjacent States." The new synod, which in 1842 divided its territory into six classes, sympathized with the opponents of Dr. Nevin, who was sustained by the eastern synod. Both synods, however, felt the need of creating a higher body that should have jurisdiction over the whole church, and consequently agreed upon the organization of a triennial general synod, which met for the first

time in Pittsburgh, in November, 1863. In the same year the church celebrated the 300th anniversary of the publication and adoption of the Heidelberg catechism. The second general synod, held in Dayton, O., in 1866, authorized the organization of two more synods, the northwestern and the Pittsburgh. The general synod of 1869 resolved to drop the word German from the name of the church. The general synod of 1872 appointed a committee to confer with the Reformed church in America, formerly called the Protestant Reformed Dutch church, with a view to forming a union. The joint committee of the two churches, at a meeting held in November, 1874, agreed upon a report declaring that the rite of confirmation and the observance of festal religious days in the Reformed church in the United States were no serious obstacles to a union; but that, on the other hand, the fact that the Reformed church in America does, and the Reformed church in the United States does not, regard the Belgic confession and the canons of the synod of Dort as standards of faith, was a discrepancy seeming to preclude any further present negotiation in the direction of organic union. The growth of the church in the western states appears to have given to what has been called the "Low Church" party the ascendancy in the church; for at the general synod of 1872 the appeal of a prominent leader of that party, Dr. Bomberger, president of Ursinus college, against a resolution of the eastern (high church) synod censuring him for assuming the office of teacher of theology and giving theological instruction independently of any proper ecclesiastical supervision and direction, was sustained by a vote of 100 to 78.—The Heidelberg catechism is the only standard of doctrine. As this book was intended to harmonize the Melancthonian and Calvinistic tendencies, it has been construed by theologians of these two schools in different ways. In the German Reformed church the Melancthonian element has been predominant, and in the American branch of the church this element was more fully developed, so that many representative theologians incurred the charge of Romanizing tendencies. This was especially the case with the doctrine of the church, which is thus explained by a leading theologian of this (the "High Church") school, President E. V. Gerhart: "The German Reformed church denies that the church is an association of converted individuals; that the Bible is the foundation of the church; that this relation of the contents of the Bible to the individual is immediate; that Protestantism has its ground immediately in the Sacred Scriptures. On the contrary, the church affirms that the person of Christ is the true principle of sound theology; that the Christian church is an organic continuation in time and space of the life powers of the new creation in Christ Jesus; that private judgment is subordinate to the general judgment of the church, as ex-

pressed particularly in the œcumenical creeds; that the individual comes to a right apprehension of the contents of the Bible through the teaching of the church; that Protestantism is a historical continuation of the church catholic, in a new and higher form of faith." The worship of the church is liturgical. The first ministers in America brought with them the liturgies of those sections of Germany and Switzerland from which they emigrated, a preference being generally given to the Palatine liturgy. A new liturgy prepared by Dr. Mayer, and adopted in 1840, did not sufficiently satisfy the theological (high church) school which had gained predominance in the church, and in 1847 a new one, known as the provisional liturgy, was reported by a special committee to the eastern synod, and by the latter recommended to the churches for trial. As it evoked an animated controversy, it was referred for revision to a committee which included Dr. Nevin, Dr. Schaff, Dr. Gerhart, Dr. Harbaugh, and Dr. Bomberger. This committee in 1866 reported a book, entitled "An Order of Worship for the Reformed Church." The eastern synod authorized its use by a vote of 53 to 14, while the general synod approved it by only a small majority (66 to 55) as "an order of worship proper to be used."—The government of the church is presbyterian. Each congregation is governed by a consistory composed of the pastor, elders, and deacons. The elders and deacons are chosen by the communicant members, and are ordained by laying on of hands. The consistory is subordinate to the classis, which consists of all the ministers and one elder from each parish of a district. The synod is composed of ministerial and lay delegates of several classes, and meets annually. The general synod, which meets triennially, is made up of delegates, ministerial and lay, from all the classes of the church. It is the duty of each pastor to catechise all the children and youth regularly, and reception into the full communion of the church, which is preceded by an examination of the candidates in the presence of the elders, takes place by the rite of confirmation. Christmas, Good Friday, Easter, and Whit Sunday are regarded as high church festivals, and are observed with much solemnity.—The reports for 1874 give the following statistics: particular synods, 5; classes, 38; ministers, 597; congregations, 1,825; communicants, 135,792; unconfirmed members, 82,249; Sunday schools, 1,187; scholars in the same, 69,132; amount of benevolent contributions, \$86,238. Eleven English and five German papers are published in the interest of the church; and there are 16 theological and literary institutions under its control.—See Dr. E. V. Gerhart, "The German Reformed Church" (1863).

REFRIGERATION. See FREEZING, ARTIFICIAL.

REFRIGERATOR (Lat. *refrigere*, to make cool), an apparatus by which various articles, generally meats and drinks, are kept cool or are

reduced in temperature. The ordinary food refrigerator is usually in the form of a chest which has a compartment for ice and one or more compartments for the food. Most of the older forms of refrigerators did not completely separate the ice from the food compartment, and many of them were merely chests with double sides separated by some non-conducting substance, as charcoal, in which the ice as well as the articles to be kept cool were placed on shelves indiscriminately. In either case the moisture from the evaporating ice filled the whole apparatus, and caused the contents to begin decaying soon after their removal, and indeed prevented their being preserved long while they were within it. In the presence of moisture, particularly when it contains the effluvia from various meats and articles of food, decomposition will go on even at a temperature considerably below the freezing point, and this cannot be secured by the presence of ice. In a dry atmosphere, like that of the Andes or the California coast, meats may be preserved without ice. If a current of air is made to circulate in a chamber surrounding an ice box, much of the moisture of the air will be condensed upon the box, and there will also be a constant collection of impurities contained in the air. To make such a refrigerator efficient, the air must be first dried by passing it through a vessel containing chloride of calcium or some substance which will rapidly absorb moisture. In either case the caloric absorbed by the ice to cool a continuous current causes it to melt rapidly. An efficient method is to place a tight ice box within a tight meat box, or surround the latter with an ice chamber, the meats to be first cooled in the open air.

REFUGIO, a S. county of Texas, on the gulf of Mexico, bounded N. E. by the Guadalupe river and Espiritu Santo bay, and S. W. by the Aransas, and intersected by the San Antonio, Mission, and other rivers; area, 1,310 sq. m.; pop. in 1870, 2,324, of whom 246 were colored. It has a level surface and a generally fertile soil. Aransas bay lies chiefly in the S. part. The chief productions in 1870 were 41,555 bushels of Indian corn, 20,504 of sweet potatoes, and 13,955 lbs. of wool. There were 9,949 horses, 1,002 mules and asses, 101,925 cattle, 4,858 sheep, and 4,333 swine. Capital, Refugio.

REGATA. See ROWING.

REGELATION. See ICE, vol. ix., p. 146.

REGENSBURG. See RATISBON.

REGGIO (REGGIO NELL' EMILIA). I. A N. province of Italy, bordering on Cremona, Mantua, Modena, Massa e Carrara, and Parma; area, 877 sq. m.; pop. in 1872, 240,635. The principal rivers are the Po, which forms the N. W. boundary, and its affluent the Enza. The mountains toward the south, in the direction of the Apennines, are barren, but the less elevated parts and the valleys are very fertile. It comprises the districts of Reggio d' Emilia and Guastalla.—Formerly the prin-

cial parts of it formed a duchy, successively ruled by the houses of Este, Correggio, Gonzaga, Visconti, and others, and from about 1527 to 1859 by the dukes of Este (afterward of Modena), excepting during the French domination (1796-1814). Marshal Oudinot was made duke of Reggio. **II.** A city (anc. *Regium Lepidi*), capital of the province, 16 m. W. N. W. of Modena; pop. about 21,000 (as a commune, in 1872, 50,657). It is the seat of a bishop, and has broad streets, some lined with arcades, a fine cathedral and several other churches, convents, a museum and public library, and trade in wine, silk, cheese, and hemp. It is the birthplace of Ariosto, whose 400th anniversary was celebrated in 1874.—*Regium Lepidi* is supposed to have been founded by *Æmilius Lepidus*, the constructor of the *Æmilian way*. It was destroyed by the Goths in 409, and refounded by Charlemagne.

REGGIO DI CALABRIA. **I.** Or *Calabria Ulteriore I.*, a province forming the S. extremity of Italy, bordering on the Ionian sea, the strait of Messina, the Tyrrhenian sea, and the province of Catanzaro; area, 1,515 sq. m.; pop. in 1872, 353,608. It is traversed by many mountains and numerous small rivers. The country is not favorable to pasturage and agriculture, but is rich in timber, oil, silk, and minerals. (See *CALABRIA*.) The province is divided into the districts of Reggio, Gerace, and Palmi. **II.** A city (anc. *Rhegium*), capital of the province, on the strait and 9 m. S. E. of the city of Messina; pop. about 18,000 (as a commune, in 1872, 35,235). It is situated in a most beautiful region, is the seat of an archbishop, and has a handsome cathedral, a theological seminary, a gymnasium and public library, an active trade in local products, and manufactories of silks, linens, and pottery. Its bay presents the remarkable optical phenomenon known as *fata morgana*.—The ancient *Rhegium* was an important city of *Magna Græcia*, colonized by Eubœans and Messenians about 740 B. C. It was governed under an aristocratic constitution by a body of 1,000. Under *Anaxilaus*, who gained supreme power in the early part of the 5th century B. C., it became very prosperous. His sons, however, were expelled by the people. In 427 the *Rhegians* supported the Athenians against Syracuse, but in 415 remained neutral. In 388 *Dionysius the Elder* besieged the city, which was desperately defended by *Phyton*. After 11 months of resistance it was compelled by famine to surrender. *Phyton* and his family were put to death, the inhabitants were sold as slaves, and the walls were razed to the ground. It was partially rebuilt by *Dionysius the Younger*. On the arrival of *Pyrrhus* in Italy in 280 it formed an alliance with the Romans, and received a garrison of 4,000 Campanian troops. The soldiers, taking advantage of an alleged defection, massacred the male inhabitants, took possession of their property, and made slaves of their wives and children. In 271 the Ro-

mans reduced the city after a long siege, executed all the surviving soldiers, and *Rhegium* came again into the hands of its former inhabitants. During the Punic wars it remained faithful to Rome. After the fall of the western empire it was subject to the emperors of the East. It was taken by *Totila* in A. D. 549, by the Saracens in 918, by *Robert Guiscard* in 1060, and by *Pedro III.* of Aragon in 1283; and during the 16th century it was three times sacked by the Turks. The modern city was almost entirely destroyed by the earthquake of 1783, and rebuilt on a larger and finer scale; and it was again much damaged by an earthquake in 1841.

REGILLUS, Lake, a small body of water in *Latium*, where, according to the historical legends of ancient Rome, was fought the battle which decided the fate of the last Roman king (about 498 B. C.). Its site has been considered doubtful, but it is now generally supposed to be identical with the lake of *Cornufelle*, at the foot of the hill on which stands the town of *Frascati* (the ancient *Tusculum*), about 10 m. S. E. of Rome; this lake was formed by a volcanic crater about half a mile in diameter, and was artificially drained in the 17th century. Here *Tarquin the Proud*, having after the failure of *Porsena's* expedition enlisted the Latins in his cause, with his son-in-law *Octavius Mamilius* gave battle to the Romans under the dictator *Albinus Postumius*, was wounded and utterly defeated, and fled alone from the field. The chiefs on both sides were nearly all killed or wounded. According to the tradition, the Romans owed their victory to *Castor* and *Pollux*, who were seen to charge at the head of their cavalry, and who first made it known in the forum at Rome. There a temple was dedicated to them, where the day (July 15) was afterward annually celebrated.

REGIMENT, a body of troops, whether infantry, cavalry, or artillery, numbering from 800 to 2,400 men, and commanded by a colonel and one or more lieutenant colonels and majors, according to the number of battalions into which it is divided. The battalions are subdivided into companies, each of which is commanded by a captain and one or more lieutenants. The regiment forms the third subdivision of an army corps, or, where the division by corps is omitted, of an army, two or more regiments constituting a brigade, and two or more brigades a division. It originated in the French service about 1560.

REGIOMONTANUS, or *Johann Müller*, a German mathematician, born at Königsberg, Franconia (whence his Latin name), June 6, 1436, died July 6, 1476. He completed his studies under *Purbach* at Vienna, whom he succeeded in 1461 as professor of mathematics. Subsequently he lectured on astronomy at Padua, spent some time at the court of *Matthias Corvinus* in Hungary, and resided at Nuremberg from 1471 to 1474, when Pope Sixtus IV.

called him to Rome to reform the calendar, and not long before his death appointed him bishop of Ratisbon. According to some authorities, he was assassinated by the sons of George of Trebizond, in whose translations Regiomontanus had detected grave errors; according to other accounts, he died of the plague. He was the first in Europe to publish an astronomical almanac, improved the knowledge of algebra, introduced decimal fractions, greatly promoted the science of trigonometry, and was the most eminent astronomer that Europe had produced. His works include *Calendarium* (in Latin and German, Nuremberg, about 1473); *Ephemerides* from 1475 to 1506, continued by Bernhard Walther and published in 1544 by Schonerus; *De Reformatione Calendarii* (Venice, 1489); *De Cometæ Magnitudine, Longitudineque* (Nuremberg, 1531); *De Triangulis* (1533); and *Tabula Directionum Projectionumque in Nativitatibus multum utiles* (Venice, 1585).—See *Regiomontanus als geistiger Vorläufer des Columbus*, by Alex. Ziegler (Langensalza, 1874).

RÉGIS, Jean Baptiste de, a French geographer, born at Istres in Provence about 1665, died in China about 1737. He was a Jesuit, and was sent to China as a missionary about 1700. His scientific attainments gained him a place at court and the favor of the emperor Hang-he, who in 1707 placed him at the head of a commission of Jesuits for making a survey and drawing up a map of the Chinese empire. Beginning with the great wall and the adjacent provinces, he completed a 15 ft. map of them, which he presented to Hang-he in January, 1709. He then drew up maps of Mantchooria, Pecheli, and the region drained by the Black river (1710); in 1711-13 he surveyed and mapped Shantung, Honan, Nanking, Chekiang, and Fokien. The health of his companions failing, he accomplished alone the survey of Yunnan, and, assisted by Father Fridelli, he finished the maps of Kweichow and Howkwang (now Hupeh and Hunan). While thus completing surveys of extraordinary magnitude, he also wrote a full history of his labors, which is in part condensed in the preface to Du Halde's *Description de la Chine* (4 vols. fol., Paris, 1735). Of the copious memoirs which he composed on the topography of the various provinces, their resources, and the manners and customs of the inhabitants, only two fragments are published by Duhalde in vol. iv. of his *Description*, one relating to Corea and the Coreans, and the other on Thibet and the hierarchy of the lamas. His knowledge of Chinese enabled him to translate into Latin the *Yih-king*, with copious notes and dissertations (edited by Julius Mohl, 2 vols., Stuttgart and Tübingen, 1834), the manuscript of which is in the national library of Paris. His labors were interrupted in 1724, when the emperor Yung-ching proscribed the Christian religion.

REGNARD, Jean François, a French dramatist, born in Paris in February, 1655, died Sept. 4,

1709. He inherited great wealth and led a roving life. In Bologna he fell in love with a lady whom he made the heroine of his novel, *La Provençale*. She and her husband, whom he designates as M. de Prade, left Genoa on the same boat with him in 1678, and they were all captured by Algerine pirates. He and the lady were ransomed, and together went to Paris in the belief that the husband was dead; but on finding him alive after reaching that capital, Regnard in despair resumed his wandering life. After exploring Lapland, and travelling through Poland, Turkey, Hungary, and other countries, he returned to France about 1683; and for most of the remainder of his life he was prominently connected with the ministry of finance, and his house in the rue Richelieu was a resort of wits. He was one of the best followers of Molière, and excelled as a satirical poet. His *Le joueur* (1696) is one of the masterpieces of the French stage. The best of the numerous editions of his works are by Crapelet (6 vols., 1822) and by Alfred Michiels, with an essay and biographical notices (2 vols., 1854).

REGNAULT, Alexandre Georges Henri. See supplement.

REGNAULT, Élias Georges Soulange Oliva, a French historian, born in London, April 22, 1801, died in Paris, Jan. 4, 1868. The son of a French physician, he studied law in Paris, and became an advocate. In 1848 he was a prominent official in the ministry of the interior, and subsequently in that of finance. He published histories of Ireland and England; *Histoire de Napoléon* (4 vols. 18mo, 1846-'7); *Histoire de huit ans* (3 vols., 1851-'4), as a continuation of the *Histoire de dix ans* by Louis Blanc, who however disputed its character as such; a history of the Danubian principalities, &c. He also translated works of Bentham and Wordsworth, and in conjunction with others Carlyle's "History of the French Revolution" (3 vols., 1866-'7).

REGNAULT, Henri Victor, a French physicist, born in Aix-la-Chapelle, July 21, 1810, died Jan. 10, 1878. He studied at the polytechnic school of Paris and was professor at Lyons till 1840, when his *Mémoire sur l'action du chlore sur l'éther chlorhydrique* secured his admission to the academy of sciences and his appointment to the chair of physical sciences in the polytechnic school, and in 1841 in the collège de France. He was chief engineer of mines from 1847 to 1854, when he became director of the porcelain works at Sèvres. In 1848 he received the Rumford medal from the royal society of London for his "Experiments to determine the Laws and the Numerical Data which enter into the Calculation of Steam Engines," and subsequently became one of the 50 foreign members of that body, which presented him with the Copley medal in November, 1869. His attention has been devoted chiefly to heat, and he was the first to demonstrate that the latent heat of steam diminishes

as the sensible heat increases, but in a slower ratio. He has also verified the law of Mariotte and Boyle on the compressibility of the gases. Accounts of his investigations on these subjects fill the 21st and 26th volumes of the *Mémoires* of the French academy of sciences. His *Cours élémentaire de chimie* (2 vols. in 4 parts, Paris, 1847-'9; 5th ed., 4 vols., 1859-'60) has been translated into several languages. Among his other works is an abstract of the preceding, *Premiers éléments de chimie* (1850; 4th ed., 1861).

REGNAULT, Jean Baptiste, a French painter, born in Paris in October, 1754, died there in November, 1829. He began life as a sailor, and subsequently studied in Paris and in Rome, where he was enabled to spend several years by winning in 1776 a first academical prize. His "Education of Achilles" and other works placed him in the front rank of the French school. He was professor at the school of fine arts from 1795 to 1818, when he was transferred to the polytechnic school.

REGNIER, Mathurin, a French poet, born in Chartres, Dec. 21, 1573, died in Rouen, Oct. 22, 1613. He was the son of Jacques Regnier, who established a tennis court in Paris, known as the *tripot Regnier*. He was educated for the church, and in 1593 went with the cardinal Joyeuse to Rome, where he remained about eight years, and subsequently returned with the duke de Béthune, French ambassador. After a life of dissipation he became in 1609 canon of the cathedral of Chartres. He was called the good Regnier on account of his amiability. Boileau, although objecting to his broad cynicism, characterized him as the satirical poet who before Molière gave the best insight into manners and life. Numerous editions of his works have appeared. The best are by Brossette (Amsterdam, 1729; London, 2 vols., 1736), Viollet-Leduc (1822; new ed., 1853), and Ed. de Barthélemy with additional poems, but not all well authenticated (1862).

REGULAR CLERKS OF ST. PAUL. See BAR-NABITES.

REGULUS, Marcus Atilius, a Roman general, died about 250 B. C. He was consul in 267, when he defeated the Sallentini, took Brundisium, and received a triumph. In 256, the ninth year of the first Punic war, he was a second time consul, and in conjunction with his colleague Manlius set out with a fleet of 330 vessels to invade Africa, defeated the Carthaginian fleet of 350 sail under Hanno and Hamilcar, landed at Clypea, and ravaged their territory. Toward the close of the year, by order of the senate, Manlius returned to Rome with his division of the forces. Regulus now defeated the three Carthaginian generals in a great battle in the mountains, and captured town after town, including Tunis. The Carthaginians sued for peace, but when the envoys protested against the extravagance of his demands, Regulus replied: "Men who are good for anything should either conquer or

submit to their betters." The negotiations were broken off, and Xanthippus, a Spartan, was placed at the head of the Carthaginian army, who defeated the Romans and took Regulus prisoner. After five years' captivity he was sent in 250 to Rome along with an embassy, on condition that he would return if the negotiations were unsuccessful. He persuaded the senate to refuse to make peace, and returned to Carthage. The story of his execution under the most barbarous tortures is now generally disbelieved.

REICHENBACH, Heinrich Gottlieb Ludwig, a German naturalist, born in Leipsic, June 8, 1793. He studied at Leipsic, took the degree of M. D., and in 1820 became professor of natural history in the medical and surgical school of Dresden. His most important work is his *Flora Germanica*, accompanied by an *Iconographia Botanica* (21 vols., Leipsic, 1823-'67). He has also published *Regnum Animale* (1834-'6, incomplete), *Vollständigste Naturgeschichte*, devoted to mammalia and birds (1845 *et seq.*), and other works.—His brother ANTON BENEDICT, born in 1807, professor of natural history at Leipsic till 1866, and his son HEINRICH GUSTAV, born in 1822, professor of botany there, have also published works on zoölogy and botany.

REICHENBACH, Karl, baron, a German naturalist, born in Stuttgart, Feb. 12, 1788, died in Leipsic, Jan. 19, 1869. He was educated at Tübingen. At the age of 16 he conceived the idea of establishing a new German state in one of the South sea islands; and for three years he devoted himself to this project, and had secretly formed a large association in Würtemberg, when it was suppressed by the French authorities on suspicion that its real objects were political, and Reichenbach was imprisoned. In 1821 he became connected with Count Hugo of Salm in the management of chemical works, iron furnaces, and machine shops at Blansko, Moravia, from which he soon secured an ample fortune; and about this time the king of Würtemberg made him a baron. From 1830 to 1834 he was engaged in the investigation of the complicated products of the distillation of organic substances, and discovered among them several compounds of carbon and hydrogen, the existence and useful properties of which were before entirely unknown; among these are creosote, paraffine, eupion, pittacal, and capnomor. He afterward entered upon an investigation of the manner in which the human system is affected by various substances, and was led to conceive the existence of a new imponderable agent, allied to electricity, magnetism, and heat, which emanates from most substances, and to the influence of which different persons are variously sensitive. Although he had given no attention to animal magnetism, the subject was inevitably encountered by him in these researches; which, however, he pursued independently of all experiments and theories that

had been made in that department. He applied the term *od* to the new force, the existence of which he believed he had established, and published *Physikalisch-physiologische Untersuchungen über die Dynamide des Magnetismus*, &c. (2d ed., 3 vols., Brunswick, 1849-50; translated into English); *Odisch-magnetische Briefe* (Stuttgart, 1852 and 1856; French translation, Paris, 1854; translated into English by Drs. Ashburner and Gregory); *Der sensitive Mensch und sein Verhalten zum Od* (2 vols., Stuttgart, 1854); and *Wer ist sensitiv, wer nicht?* (Brunswick, 1856).

REICHENBERG, a town of Bohemia, on the Neisse, 55 m. N. N. E. of Prague; pop. in 1870, 22,394. Next to Prague and Pilsen it is the most populous city of Bohemia, and it is one of the most flourishing centres of Austrian industry. It has a castle, several industrial and other schools, and a new theatre. The principal manufactures are woollen, cotton, and linen stuffs and yarn.

REICHSTADT, Duke of. See BONAPARTE, vol. iii., p. 48.

REID, Mayne, a British novelist, born in the north of Ireland in 1818. He is the son of a Presbyterian minister, and was educated for the church, but, being fonder of adventure than of theology, set out in 1838 for America. Arriving at New Orleans, he engaged in trading and hunting excursions up the Red and Missouri rivers, and travelled through nearly every state of the Union. Subsequently he settled in Philadelphia, joined the army in the Mexican war, and was wounded in the assault upon Chapultepec. In 1849 he set out to fight for the Hungarians during their struggle with Austria; but by the time he reached Paris the revolution had been suppressed. He has since resided chiefly in London, and has written a series of very popular books for boys. Among his works are: "The Rifle Rangers" (1849), "The Scalp Hunters" (1850), "The Quadroon" (1856), "Osceola" (1858), "Ran Away to Sea" (1861), "The Maroon" (1862), "The Cliff Climbers" (1864), "Afloat in the Forest" (1866), "Quadrupeds" (1867), "The Child Wife" (1868), "The Castaways" (1870), and "The Finger of Fate." In 1869 he established in New York a short-lived monthly magazine entitled "Onward."

REID, Thomas, a Scottish metaphysician, born at Strachan, Kincardineshire, April 26, 1710, died in Glasgow, Oct. 7, 1796. He graduated at Marischal college, Aberdeen, in 1726, was librarian of the college till 1736, and in 1737 was presented to the neighboring living of New Machar. In 1748 he published a paper in the London "Philosophical Transactions," in which he opposed the introduction of mathematical formulas into metaphysical and moral speculations. He was elected in 1752 professor of philosophy in King's college, his department comprehending logic, ethics, mathematics, and physics. His "Inquiry into the Human Mind on the Principles of Common Sense" (London,

1763) aimed at the refutation of Hume's skeptical theory. He introduced the doctrine of an original instinct or common sense as the ground of belief. In 1764 he was transferred to the university of Glasgow as professor of moral philosophy, and retired in 1781. In 1785 he published his "Essays on the Intellectual Powers of Man," consisting of his academical lectures (new edition by the Rev. James Walker, D. D., Cambridge, Mass., 1850), and in 1788 his "Essays on the Active Powers of Man." In 1863 a complete edition of his works, with preface, notes, and supplementary dissertations by Sir William Hamilton, and a memoir by Dugald Stewart, was published in Edinburgh (2 vols. 8vo).

REID, Sir William, a British meteorologist, born at Kinglassie, Fifeshire, in 1791, died in London, Oct. 31, 1858. He entered the army as lieutenant of royal engineers in 1809, served under the duke of Wellington in the Peninsula, was in America in the war of 1812, and again served under the duke in Belgium in 1815, being present at the battle of Waterloo. In 1816 he took part, with the rank of captain, in the attack on Algiers. He subsequently became adjutant of the corps of sappers and miners, and in 1839 was elected a fellow of the royal society. He was appointed governor of Bermuda in 1838, and by his tact and skill greatly improved the agriculture of the island, its products being introduced through his efforts into the New York market. He was appointed governor of the Windward islands in 1846, and in 1848 returned to England, and was appointed commanding engineer at Woolwich. During the great exhibition of 1851 he was actively engaged in the promotion of its objects, and succeeded Robert Stephenson as chairman of the executive committee. In the same year he was appointed governor of Malta, and was knighted. He held that post through the Crimean war, was made a major general in 1856, and returned to England in 1858. Having been detailed to superintend the repairs of the injury done by a severe hurricane in Barbadoes in 1831, he devoted much time to the study of meteorology. He published "An Attempt to develop the Law of Storms by means of Facts, arranged according to Place and Time" (1838), and "The Progress of the Development of the Law of Storms," &c. (1849).

REIGATE, a market town of Surrey, England, 21 m. S. by W. of London, on the London and Brighton and Southeast railways; pop. in 1871, 15,916. It has a church containing several costly monuments, a grammar school, and the remains of a castle, with a cave where the barons are said to have met to arrange the articles of Magna Charta. It carries on a brisk trade in fuller's earth and fine sand used in the manufacture of glass.

REIL, Johann Christian, a German anatomist, born in East Friesland, Feb. 28, 1759, died in Berlin, Nov. 22, 1813. He studied at the universities of Göttingen and Halle, taking his

degree at the latter in 1782. In 1787 he was made professor of clinical medicine at Halle, and in 1810 was called to Berlin on the establishment of the university in that city. His name is perpetuated in connection with the "island of Reil," an isolated cluster of cerebral convolutions, situated at the bottom of the fissure of Sylvius, between the anterior and middle lobes of the cerebrum. Reil conducted for 20 years a periodical entitled *Archiv für Physiologie*, and left various works on the structure of the nerves, clinical medicine, &c.

REIMARUS, Hermann Samuel, a German scholar, born in Hamburg, Dec. 22, 1694, died there, March 1, 1768. He was educated at Jena and at Wittenberg, made a journey through Belgium and a great part of England in 1720, became rector in Wismar in 1723, and in 1727 received the professorship of Hebrew in the gymnasium of Hamburg, afterward united with that of mathematics, which he held till his death. He married in 1728 the daughter of J. A. Fabricius, and was the author of the celebrated "Wolfenbüttel Fragments," published by Lessing in 1774-'8. These productions, which challenge the supernatural origin of Christianity, had been imparted by Reimar only to his intimate friends; and Lessing, who had obtained a copy, edited them as manuscripts belonging to the Wolfenbüttel library.

REIMS. See RHEIMS.

REINDEER (*rangifer tarandus*, Gray), the name usually given to the old world species of rangerine deer, of which the American woodland and barren ground caribou are believed to be mere varieties. The description and figure given under CARIBOU will answer for the European animal, which, like its American variety, differs greatly in size; the large Siberian variety is ridden by the Tungusians, who also use it for draught, as the Laplanders do their smaller animal. The tame reindeer of the Laplander does not exceed in size, and often does not equal, the English red deer or stag. After the casting of the coat the hair is brownish yellow, but as the dog days approach it becomes whiter, until it is at last almost entirely white. Round the eye the color is always black. The longest hair is under the neck. The mouth, tail, and parts near the latter, are white, and the feet at the insertion of the hoof are surrounded with a white ring. The hair of the body is so thick that the skin cannot be seen when it is put aside. When the hair is cast, it does not come away with the root, but breaks at the base. The horns are cylindrical, with a short branch behind, compressed at the top, and palmated with many segments, beginning to curve back in the middle, and are an ell and a quarter long. A single branch sometimes, but seldom two, springs from each horn in front, very near the base, frequently equaling the length of the head, compressed at the top and branched. The domestic reindeer of Lapland feeds wholly on a species of lichen peculiar to the country, for which he roots

under the snow with his nose, after the fashion of swine. He will eat no dried fodder, unless it be perhaps the river horsetail, *equisetum fluviatile*. To the Laplander the reindeer is invaluable, being in fact his ox, his sheep, and his horse, in one animal. He is too valuable to kill in general, although his meat is delicious; the milk of the herds is the principal support of the owner and his family; while, as an animal of draught, its speed, endurance, and particular adaptation to travelling on snow, render it the most valuable of creatures to men dwelling in the frozen latitudes. The ordinary weight drawn by this animal is 240 lbs., but he can travel with 300. Its speed and endurance are very great; it has been known to run at the rate of nearly 19 m. an hour, and it is not unusual for it to travel 150 m. in 19 hours. —During prehistoric times, in the latter part of the palæolithic division of the stone age, the reindeer inhabited southern France, and was hunted by the cave men. Its coexistence there with the musk ox and other arctic species shows that the climate was then much colder than at present, probably owing to the greater extent of the glaciers descending from the Alps and Pyrenees. The reindeer lived in central Europe in Cæsar's time, in the north of Scotland probably as late as the 12th century, and in Denmark as late as the 16th.

REINHART, Benjamin F. See supplement.

REINHART, Charles S. See supplement.

REINHOLD, Karl Leonhard, a German philosopher, born in Vienna, Oct. 26, 1758, died in Kiel, April 10, 1823. He was partially educated by the Jesuits, and after the suppression of that order became teacher of philosophy and mathematics and master of the novitiates in a Benedictine convent at Vienna. In 1783 he escaped by flight, and in 1784 turned Protestant at Weimar and married Wieland's daughter. In 1787 he was appointed professor of philosophy at Jena, which chiefly through his influence became a stronghold of the Kantian philosophy. In 1794 he was transferred to Kiel. Reinhold's chief merit is that of an interpreter and popular advocate of Kant's views. His works are numerous.

REINKENS, Joseph Hubert, a German theologian, born at Burtscheid, near Aix-la-Chapelle, March 1, 1821. He studied theology at Bonn, was ordained a priest of the Roman Catholic church, and became lecturer on church history at Breslau. He was cathedral preacher in 1852-'3, and in 1857 was appointed professor of theology. In 1870 he coöperated with Dollinger in the Old Catholic movement, opposing the dogma of infallibility, and published *Papst und Papstthum nach der Zeichnung des heiligen Bernhard von Clairvaux*. He was suspended by the bishop of Breslau, and the students of the university were forbidden to attend his lectures. He also published *Ueber päpstliche Unfehlbarkeit* (1870), which the bishop endeavored to suppress. On Aug. 11, 1873, he was consecrated bishop at

Rotterdam, by the Jansenist bishop of Deventer. Soon afterward he took an oath of allegiance to the government, and received from the emperor of Germany a patent of recognition, requiring his acknowledgment in all respects as a Catholic bishop. He issued a pastoral letter to the Old Catholics of Germany, and a second pastoral in reply to the papal encyclical of Nov. 21. He has also published *De Clemente Presbytero Alexandrino* (Breslau, 1851); *Hilarius von Poitiers* (Schaffhausen, 1864); *Martin von Tours* (Breslau, 1866); *Aristoteles über Kunst, besonders über Tragödie* (Vienna, 1870); and *Die päpstlichen Decrete vom 18 Juli 1870* (Munich, 1871).

REISKE, Johann Jakob, a German philologist, born at Zörbig, near Leipsic, Dec. 25, 1716, died in Leipsic, Aug. 14, 1774. He was educated at the university of Leipsic, where he acquired an extensive knowledge of Arabic. He afterward went to Leyden and became a corrector of the press, while his leisure hours were spent in ransacking the oriental treasures of the university library. He also studied medicine, and after remaining in Leyden eight years returned to Leipsic in 1746. He became professor of Arabic in 1748, and in 1758 was made rector of the St. Nicholas school in Leipsic. He edited a large number of Greek and Arabic works, and translated Demosthenes and Æschines. His life, partly autobiographical, was published by his wife (1785), and his correspondence with Moses Mendelssohn and Lessing appeared at Berlin in 1789.

REISSIGER, Karl Gottlieb, a German composer, born at Belzig, near Wittenberg, Jan. 31, 1798, died in Dresden, Nov. 7, 1859. He was intended for the church, but devoted himself to music, became professor at the musical institution of Berlin, and on the death of Weber succeeded him as chapelmaster at Dresden. His most successful operas are *Die Felsenmühle*, *Libella*, *Turandot*, *Adèle de Foix*, and *Der Schiffbruch der Medusa*. He is better known by the oratorio *David*, and his minor pieces, particularly his songs for the bass voice, such as Heine's *Zwei Grenadiere*.

RELIGIOUS ORDERS, the term applied to associations of men or women in the Roman Catholic church and the oriental churches, whose members live in common in convents. The history of these associations is given in the article **MONACHISM**. The common bond of union among all the religious orders, and which distinguishes them from other classes of associations, is retirement from the world, celibacy, and their organization, by means of religious vows, into communities of an entirely ecclesiastical character. The official list in the *Gerarchia Cattolica* of 1875, published in the Vatican, divides religious orders into six classes: 1, the regular canons, comprising the regular canons of the Most Holy Saviour of the Lateran, those of the basilica of Santa Croce, and the Premonstratensians; 2, regular clerks, embracing Theatines, Barnabites, Somaschians,

Jesuits, minor clerks, ministers of the infirm, fathers of the Mother of God, and fathers of the pious schools, or Piarists; 3, religious congregations, including the Passionists and Redemptorists; 4, ecclesiastical congregations, including the Doctrinarians, Lazarists or priests of the mission, pious laborers, oblates of Mary Immaculate, missionaries of the Precious Blood, institute of charity (Rosmini's), priests of the Sacred Hearts of Jesus and Mary, priests of the society of missions, priests of the resurrection, priests of the Holy Cross (of Le Mans), brothers of the Christian schools, and brothers of mercy; 5, monks, including the Basilians, Benedictines, Camaldules, hermits of Tuscany, hermits of Monte Corona, hermits of Vallombrosa, Cistercians, Trappists, Trappists of the Rancé reform, Benedictines of Monte Vergine, Olivetans, Silvestrines, Chartreux, Antonians (comprising Chaldeans, Maronites, and Armenians of Mt. Lebanon), Mekhitarists or Armenian Benedictines, and Basilians of the Greco-Melchite rite, comprising the Joanites of Palestine; 6, mendicants, including the Dominicans, minor Observants (comprising the reformed Observants, the minor Recollects, and Alcantarines), minor Conventuals, minor Capuchins, third order of St. Francis, Augustinians and discalced Augustinians, Carmelites of the primitive observance and reformed Carmelites, Servites or servants of Mary, Minims, *Mercedari* or fathers of the redemption of slaves, Trinitarians (primitive and reformed), Hieronymites or order of St. Jerome, hospitallers of St. John of God, and fathers of penitence. This classification is founded on the original distinction between the clergy or ordinary ministers of religion and the monks, who in the beginning were mostly or exclusively laymen, or who when priests lived in seclusion, and had no share in the ministrations of the clergy. The partly or wholly monastic forms adopted after the 4th century in the East, and especially in the West, by the cathedral and parochial clergy, caused them to be generally designated as *clerici canonici*. But this designation, particularly during the reign of feudalism, came to be applied exclusively to the clergy of cathedral or collegiate churches, who lived in common under some such rule as that of St. Augustine. This gave rise to the institution of canons regular. The parochial clergy were organized in this way by Eusebius, bishop of Vercelli (died 370), by St. Ambrose (died 397) in Milan, and by St. Augustine (died 430) at Hippo. This quasi-monastic form was propagated by St. Gregory the Great in Sicily and in Rome before his elevation to the papacy, and according to Lingard it was established in England by Augustin, archbishop of Canterbury, and prevailed in the chief churches there till supplanted by the strict Benedictine rule. The whole clergy of the British islands, as well as of several continental countries, continued at least during the missionary epoch to live in establishments called monasteries by contemporary

writers, though distinguished by them into clerical and monastic houses. Thus the first great class of religious associations embraces those anciently designated as the "regular clergy," that is, persons who were by vocation clergymen and embraced a monastic form of life; while the second class, or monks proper, comprises persons who are devoted to a life of seclusion, and are supposed to engage only by accident in the active ministrations of the parochial clergy. Hence both in time and in dignity the regular clergy are first. The canons regular of all denominations were always held by their rule to the public recitation or chanting of the divine office. The regular clerks of the society of Jesus were the first to deviate from this custom; and their exemption from choral service caused them to be bitterly assailed by other religious orders, who for this very reason refused for a long time to acknowledge them as one of the monastic brotherhoods. The third group of regular clerks, consisting of the Passionists and Redemptorists, are called in the list "religious congregations," because their vows have less of solemnity than those of the Jesuits, and are more binding than those of the following groups. They are, besides, held to recite the office in common. The members of the "ecclesiastical congregations" are held together by simple vows of obedience and poverty, or by promises of fidelity to their respective rules, and aim at discharging the clerical functions, or some duties closely connected therewith, such as the instruction of youth.—The monks proper are subdivided into two great families. The distinctive characteristics of the first are a life of seclusion, varied in some groups, like the Benedictines, by devotion to literary culture, and in others, like the Trappists, by a seeking after penitential austerity. The mendicants originally aimed at combining the contemplative and austere retirement of the monk with the active ministrations of the canons regular. They obtained their early reputation and popularity by living in poverty, prayer, and self-abnegation in the midst of the people to whose spiritual needs they ministered.—To most of the religious orders, soon after their formation, nuns of the same rule attached themselves. They were often called the second branch of the order, and their convents were generally under the ecclesiastical jurisdiction of the priests of the order. Besides the nuns, most of the orders received numerous additions by admitting lay brothers (*fratres conversi*) or lay sisters (*sorores conversæ*), who were charged with the performance of the housework and with keeping up communication with the world.—The Protestant churches in general have declared themselves opposed to the fundamental principle of monastic institutions; but in modern times several such communities, living in common and binding themselves to the observance of a rule, have been formed. In the church of England

an institution of sisterhoods has been considerably extended under the auspices of the so-called high church party. More recently an Anglican clergyman, the Rev. Mr. Lyne, assuming the name of Father Ignatius, endeavored to establish an Anglican branch of the Benedictine order; but the first monastery at Norwich, after the trial of a few years, had to be abandoned. Another clergyman tried to revive the canons regular of the Augustinian order, but, although the number of those who advocate the revival of monasticism in the church of England has considerably increased, notable results have not yet been obtained. In the Evangelical church of Germany communities of women, called deaconesses, were established for charitable purposes, especially for nursing the sick. This institution has assumed large dimensions and established branches in many other countries. (See DEACONESSES.) The most curious example of a Protestant religious order is found in the United States, among the Seventh-Day German Baptists or Seventh-Day Dunkers. (See DUNKERS.)

REMAINDER, in law, an interest in that which remains of a whole estate, after a partial or particular estate, as it is called, which was reserved out of the whole, has been determined. Like many other branches of the common law, it had its foundation in the feudal polity. In the long lapse of time, and under the influence of other branches of the English real property law, the learning of remainder has been wrought out into manifold distinctions and refinements. Sir Edward Coke says a remainder is "a remnant of an estate in land, depending upon a particular prior estate, created at the same time and by the same instrument, and limited to arise immediately on the determination of that estate, and not in abridgment of it." Thus, if a man who is seized in fee of lands grant them to A for 20 years, and, after that term has expired, to B and his heirs forever, A is tenant for years, and B has remainder in fee. But the residue of the estate after A's term may be still subdivided; for example, the limitation to B may be for life, then a limitation to C in tail, remainder over to D in fee. It matters not how many partial estates may be thus successively reserved or carved, as the phrase is, out of the fee; all together, with the final limitation, form one whole estate.—It is one of the cardinal rules respecting remainders, that no remainder can be limited upon or after the grant of an estate in fee, for the fee is the whole and there can be nothing left. Nor can there be a remainder without a prior partial estate. This partial or particular estate is also essential to the existence of any subsequent remainder that amounts to a freehold; for, by an old rule of the common law, a freehold cannot be created to commence *in futuro*, but must commence at the time of the grant; and inasmuch as, with all partial estates, the remainder forms but one whole, delivery of possession to the first particular tenant vests

possession in the freehold tenant also. The seisin which the grantor gives to the first taker is transmitted by him, and by each, to his successor, until it passes at last to the first remainderman. Each estate supports that which follows it. Hence arises another cardinal rule, that the remainder must vest in the grantee during the continuance of the partial estate, or on the instant that it is determined. Thus, if A and B be joint tenants for life, remainder to the survivor in fee, on the death of A the joint estate is severed; B becomes in the moment of A's death the designated remainderman, and the remainder is good. But if the limitation be to A for life, remainder to the son of B in tail, and A die and so his estate determine before B have a son, then the remainder fails.—Remainders are either vested or contingent. They are vested when there is an immediate right of present enjoyment, or a present fixed right of future enjoyment, it being the present capacity of taking effect in possession if the possession were to become vacant, and not the certainty that the possession will become vacant before the estate limited in remainder determines, that distinguishes a vested remainder from one that is contingent. Thus a limitation to A for years, remainder to B and the heirs of his body, gives B a vested remainder, for he is capable of taking should the particular estate fall in, though it is not certain that he will not die without heirs before A's death. A contingent remainder depends on an event or condition which may either never happen or be performed, or not till after the determination of the preceding estate; or, to use the definition of the New York statute, which Chancellor Kent commends for its brevity and precision, a remainder is contingent while the person to whom or the event upon which it is limited to take effect remains uncertain. An example of a remainder contingent as to the person would be a limitation to A for life, remainder to B's eldest son (as yet unborn) in tail. This last limitation is contingent, because it is uncertain whether a son will be born to B; and if A dies before that happens, the remainder is gone. A case of contingency in respect to the event would be presented by a limitation to A for life, and in case B survives him, then to B in fee. Here the uncertainty of B's surviving A is that which renders the remainder a contingent one.—The English doctrine of remainders, that is, the common law doctrine, remains unaltered in most of the United States. In one or two states slight changes, and in New York some which are quite material, have been made by statute.

REMBRANDT VAN RYN, Paul Harmens, a Dutch painter, born in Leyden, July 15, 1607, died in Amsterdam, Oct. 8, 1669. He was the son of a miller, and the suffix van Ryn was derived from his birth in a windmill on the bank of the Old Rhine (Oude Ryn). He was first placed with Jacob van Swanenburch of Leyden, and afterward studied under Pieter Lastman at

Amsterdam. About 1623 he fitted up a studio in his father's mill. It is supposed that from noticing the effects produced upon surrounding objects by the one ray admitted into the lofty chamber of the mill from the small window which formed its ventilator, he derived those notions of color and powerful contrasts of light and shadow which made him the great master of *chiaroscuro*. He produced his first great work, a portrait of his mother, in 1628, and in 1630 he settled in Amsterdam. His pictures brought large prices, pupils flocked to him from all parts of northern Europe, for the instruction of each of whom he received 100 florins a year, and from his etchings, which he produced in great numbers and which were esteemed as highly as his paintings, his profits were also considerable. He married Saskia van Ulenburgh in 1634, and had four children, none of whom survived him. He mingled little in society, but passed hours at the ale house. A second marriage involved him in difficulties; he was declared a bankrupt in 1656, and the remainder of his years were spent in poverty. As a historical painter Rembrandt held that the imitation of vulgar nature was preferable to the cultivation of ideal beauty; and his manner depends upon the elaboration of a single element in art, that of light and shade. His merits and defects are equally striking. Among his portraits, that of "Nicholas Tulp dissecting in the Presence of his Pupils," the *Staalmeesters*, or council of one of the guilds of Amsterdam, the "Ship Builder and his Wife," the "Jew Merchant," and the "Night Watch" are most esteemed. Of his historical pictures the most remarkable are "Duke Adolphus of Gueldres threatening his Father," "Moses destroying the Tables of the Law," "The Sacrifice of Abraham," "The Woman taken in Adultery," "The Descent from the Cross," "The Nativity," "Christ in the Garden with Mary Magdalene," and "The Adoration of the Magi." His peculiar style is perhaps more strikingly displayed in his etchings than in his paintings. They were a great source of profit to him, and one, "Christ healing the Sick," was called the "Hundred Guilders," from the fact that he refused to sell it for less than that sum. In 1868 a second-state impression of this plate was sold in London for £1,180. His paintings, of which 640 are specified in Smith's *Catalogue raisonné*, are variously valued at from \$500 to \$20,000. The best of them are still owned in Holland.—The most authentic account of his life is in French by C. Vosmaer (2 vols., the Hague, 1869). See also *Rembrandt, discours sur sa vie et son génie*, &c., translated from the Dutch of P. Scheltema (Paris, 1866).

REMONSTRANTS. See ARMINIANS.

REMORA. See SUCKING FISH.

REMORINO. See RAMORINO.

REMSCHIED, a city of Rhenish Prussia, 6 m. S. S. E. of Elberfeld; pop. in 1871, 22,017. It is celebrated for manufactures of iron and

steel, especially locks, nails, and cutlery, which have grown up within the past 60 years, the population in 1816 being but about 7,000. The immediate region yields neither iron nor coal, but its numerous streams furnish abundant water power. The number of different articles manufactured is said to be not far from 2,000, which are known in Germany as *Remscheider Waaren*.

REMUS. See ROMULUS.

RÉMUSAT. I. *Claire Elisabeth Jeanne Gravion de Vergennes*, countess de, a French authoress, born in Paris, Jan. 5, 1780, died there, Dec. 16, 1821. She was a grandniece of Vergennes, prime minister under Louis XVI. In her youth she was celebrated for her beauty, under the name of Clary, and was a friend and neighbor of Mme. d'Houdetot at Sannois. She married Count de Rémusat, afterward chamberlain of Napoleon, in 1796, and became an intimate friend and lady-in-waiting of Josephine. Among her writings is an *Essai sur l'éducation des femmes*, which was published by her son (1824; new ed., 1842). II. *Charles François Marie de*, count, a French author and statesman, son of the preceding, born in Paris, March 14, 1797, died there, June 6, 1875. In 1830 he was elected to the chamber of deputies, where he became a follower of Guizot. He held office in 1836 under Molé, and in 1840 as minister of the interior under his life-long friend Thiers; and he was a member of the chamber till 1848, and of the subsequent assemblies till the *coup d'état* of Dec. 2, 1851, when he was banished, returning in September, 1852. In 1871 he became minister of foreign affairs. In 1873 he was defeated as a candidate for the national assembly by the workmen of Paris, and soon afterward he retired with Thiers (May 24). He was a prominent member of the academy, and Royer-Collard described him as "the first of amateurs in everything." His principal works are: *Essais de philosophie* (2 vols., 1842); *Abélard* (2 vols., 1845); *Passé et présent* (2 vols., 1847); *Saint-Anselme de Cantorbéry* (1853); *Bacon, sa vie, son temps et sa philosophie* (1857); *L'Angleterre au XVIII^e siècle* (2 vols., 1856); *Histoire de la philosophie en Angleterre depuis Bacon jusqu'à Locke* (2 vols., 1875); and *Lord Herbert de Cherbury, sa vie et ses œuvres, ou Les origines de la philosophie du sens commun et de la théologie naturelle en Angleterre* (1875).

RÉMUSAT, Jean Pierre Abel, a French orientalist, born in Paris, Sept. 5, 1788, died of cholera, June 4, 1832. While a laborious student of medicine he taught himself Chinese and several Tartar languages, of the latter making his own vocabulary. In 1811 he published two works, the results of his studies. In 1813, while he was in active practice as a surgeon, two more volumes appeared. In 1814, a chair of Chinese and Mantchou having been founded in the collège de France, he was made professor. Rémusat's scientific studies aided his linguistic labors; but his

Tableau complet des connaissances des Chinois en histoire naturelle was never finished. His chief works are: *Plan d'un dictionnaire chinois* (1814); *Recherches sur les langues tartares, ou Mémoires sur différents points de la grammaire et de la littérature des Mantchoux, des Mongols, des Ouigours et des Thibétains* (1820); and *Éléments de la grammaire chinoise* (1822).

REMY, or *Remi* (Lat. REMIGIUS), *Saint*, called the apostle of the Franks, born at Cerny, near Laon, about 439, died in Rheims, Jan. 13, 533. He was elected bishop of Rheims, where he had studied, in his 22d year, and with the aid of King Clovis, whom he baptized, spread the knowledge of Christianity among the people. Apollinaris Sidonius, his contemporary, says he was the most eloquent man of the age. He established bishops in the cities of Tournay, Laon, Arras, Thérouanne, and Cambrai. His feast is celebrated on Oct. 1. His shrine is in the beautiful abbatial church of St. Remy at Rheims. See Butler's "Lives of the Saints," and lives of St. Remy by Armand-Prior (Paris, 1846) and Aubert (1849).—There are two other saints of the same name: a bishop of Strasbourg, who died in 803, and an archbishop of Lyons, who died in 875.

RENAISSANCE (Fr., new birth), the designation of a peculiar style of architecture and ornamentation, founded on the antique, which took its origin in Italy about the commencement of the 15th century (see ARCHITECTURE, vol. i., p. 664); also of the period commencing with the 14th and ending with the first half of the 16th century, which witnessed the revival of classical literature and the fine arts in southern Europe.—See Pater, "Studies in the History of Renaissance" (London, 1873), and John Addington Symonds, "Renaissance in Italy" (London, 1875).

RENAN, Joseph Ernest, a French philologist, born at Tréguier, department of Côtes-du-Nord, Feb. 27, 1823. He was destined for the church, studied Hebrew, Arabic, and Syriac in Paris, and in 1847 obtained the Volney prize for a treatise on the Semitic languages, afterward published as the first part of an *Histoire générale et système comparé des langues sémitiques* (8vo, 1855; 4th ed., enlarged, 1864). He was sent by the academy of inscriptions and belles-lettres in 1849 on a literary mission to Italy, and brought back materials for a historical essay on the philosopher Averroes, which was published under the title *Averroès et l'averroïsme* (1852). In 1851 he was attached to the department of manuscripts in the national library, and in 1856 was elected a member of the academy of inscriptions and belles-lettres. In 1858 he published a translation of the book of Job, with an essay on the age and character of the poem; and in 1860 a translation of the book of Canticles. On the occupation of Syria by the French in 1860, he was sent with the army at the head of a scientific commission, and explored the sites of Tyre and Sidon, the Lebanon, and other localities. In 1862 he was ap-

pointed professor of Hebrew in the collège de France; but his opening lecture excited such intense opposition that his appointment was not confirmed, and he was dismissed from the chair in 1864. In connection with this subject he published a pamphlet which passed through five editions. In 1863 his *Vie de Jésus* appeared, treating the gospel narrative as little more than a legendary romance. It passed through 13 editions in five years, and was immediately translated into the different languages of Europe (English translation by Charles E. Wilbour, New York, 1863). This work was intended to be the first of a series under the general title *Histoire des origines du Christianisme*, which he has continued in *Les apôtres* (1866), *Saint Paul* (1869), and *L'Antéchrist* (1873), to be followed by a fifth work entitled *Les derniers hommes apostoliques*. He has also published *Etudes d'histoire religieuse* (1857; revised ed., 1864); *De l'origine du langage* (1858); *Essais de morale et de critique* (1859; English translation by O. B. Frothingham, New York, 1864); *Nouvelles considérations sur le caractère général des peuples sémitiques* (1859); *Mission de Phénicie* (1864 et seq.); *Nouvelles observations d'épigraphie hébraïque* (1867); *Rapport sur les progrès de la littérature orientale* (1868); *La réforme intellectuelle et morale* (1872); and *De la part des peuples sémitiques dans la civilisation* (7th ed., 1875).

RENDEL, James Meadows, an English engineer, born near Dartmoor, Devonshire, in 1799, died in London, Nov. 21, 1856. He was early employed in the construction of bridges, and from 1824 to 1827 was engaged upon that across the Laira within the port of Plymouth. In 1831 he introduced a new system of crossing rivers by means of floating bridges and steam power. His most celebrated achievements are the harbors of refuge at Holyhead and Portland.

RENSBURG, a town of Prussia, in the province of Schleswig-Holstein, on the Eider, 54 m. N. W. of Hamburg; pop. in 1871, 11,514. The old town stands on an island in the channel of the Eider, and the new on the S. arm of the river. Beyond the N. arm is another part of the town called Schleuskühle or Kronwerk. During the Schleswig-Holstein war of 1848-'51 it was in the hands of the Germans. The strong fortifications were razed by the Danes in 1852.

RENÉ I., surnamed the Good, duke of Anjou, count of Provence, and titular king of Naples, born in Angers, Jan. 16, 1409, died in Aix, July 10, 1480. He was the second son of Louis of Anjou (crowned king of Naples in 1384) and Yolande, daughter of the king of Aragon. Louis was never able to make good his rights, although his eldest son Louis III., having been adopted by the queen Joanna II., gained possession of the throne. He died Nov. 15, 1434, and left Anjou and Provence, together with his claims upon Naples, Sicily, and Jerusalem,

to his brother René, whom Joanna II., dying in 1435, also appointed her heir. In 1430 René, as the successor of his maternal great-uncle, had become duke of Bar, and in 1431, on the death of his father-in-law, Duke Charles of Lorraine, had been confirmed by the estates in the possession of that duchy. But his claims were contested in the same year by the count of Vaudemont, nephew of Charles, by whom he was taken prisoner, and the decision of the question of succession was left by the nobility of Lorraine to the emperor Sigismund. René was released for a year, but compelled to give his sons as hostages. The emperor finally decided in his favor. Vaudemont would not submit, and René was compelled to return to prison. A few weeks afterward a deputation brought to him the crown of Naples and Sicily. Unable to obtain release, he appointed his wife Isabella regent of Anjou, Provence, Naples, and Sicily. She arrived in Italy on Oct. 18, 1435, but found herself at once in conflict with the party of King Alfonso of Aragon. In 1437 René purchased his freedom and the acknowledgment of his right to Lorraine for 400,000 pieces of gold, and led an army to Naples, but was obliged to leave the kingdom to his opponent and return in 1442 to Provence. Having restored order in Lorraine, he gave it over to his eldest son, John, titular duke of Calabria, and devoted himself to letters and the arts. In 1467 the Aragonese offered him the sovereignty of their country, which he declined for himself but accepted for his son, the duke of Calabria, who died soon after entering Aragon. The only companion of René's closing years was his exiled daughter, Queen Margaret of England, wife of Henry VI. King René was prominent as a patron of letters and the arts. Many paintings and pieces of sculpture were formerly attributed to his own hand, but have been shown to have been done only under his auspices. A considerable number of his writings still remain, the chief of which were edited by the count de Quatrebarbes, *Œuvres du roi René* (4 vols. 4to, Paris and Angers, 1845-'6). See also *Le Roi René, sa vie et ses travaux*, by De Lecoy de la Marche (Paris, 1875).

RENFREW, an E. county of Ontario, Canada, bounded N. E. by the Ottawa river above Ottawa; area, 2,389 sq. m.; pop. in 1871, 27,977, of whom 13,565 were of Irish, 6,147 of Scotch, 2,882 of French, 2,658 of English, and 2,318 of German origin or descent. It is intersected by the Bonnechere and Madawaska rivers. The surface is rough and hilly and the soil fertile. Capital, Pembroke.

RENFREWSHIRE, a W. county of Scotland, bounded N. by the river Clyde, and W. by the frith of Clyde; area, 254 sq. m.; pop. in 1871, 216,947. The chief towns are Paisley, Greenock, Renfrew, and Port Glasgow. The whole county is included in the basin of the Clyde, and its E. part is within the great coal district of the west of Scotland. Alum and iron are

produced in large quantities. The Stuart family had their earliest known patrimonial inheritance in the parish of Renfrew in this county.

RENI, Guido. See GUIDO RENI.

RENNELL, James, an English geographer, born near Chudleigh, Devonshire, Nov. 3, 1742, died in London, March 29, 1830. He entered the navy, served in India, became engineer in the East India company's service, distinguished himself in the campaigns of Lord Clive, and was made surveyor general of Bengal, returning to England in 1782. In 1795 he assisted Mungo Park in the preparations for his journey in Africa, and afterward contributed geographical illustrations to his travels. He was buried in Westminster abbey. The works by which Rennell is best known are "The Geographical System of Herodotus Examined and Explained" (4to, 1800), and "Observations on the Topography of the Plain of Troy" (4to, 1814). Among his other works are: an atlas of Bengal (1781), and a map of Hindostan, with an explanatory memoir (1783); "Elucidations of African Geography" (1793-'8); "Illustrations of the Expedition of the Younger Cyrus, and the Retreat of the Ten Thousand" (1816); "Comparative Geography of Western Asia" (1831); and "An Investigation of the Currents of the Atlantic Ocean" (1832).

RENNES, a fortified town of France, capital of the department of Ille-et-Vilaine, at the junction of the rivers Ille and Vilaine, 190 m. W. S. W. of Paris; pop. in 1872, 52,044. The court house is an ancient edifice, in which the estates of Brittany used to meet. There is a library of 45,000 volumes, and also a gallery of art. The town contains an academy with faculties of law, sciences, and literature, a secondary school of medicine, a theological seminary, and a normal college. Linen, woollen, leather, and pottery are manufactured. The Vilaine is navigable for barges, and canals lead to Brest, St. Malo, and Nantes.—The ancient name of the town was Condate, and the modern appellation of Rennes was derived from an Armorican tribe called by the Romans Redones. In the middle ages it was the capital of the Breton dukes, till it became united to France by the marriage of Anne of Brittany to Charles VIII. (See BRITANY.) It withstood several sieges, the most remarkable of which was that of the English under the duke of Lancaster (1356), who was obliged to retire after six months.

RENNET. See CHEESE, vol. iv., p. 349.

RENNIE, John, a British engineer, born at Phantassie, Haddingtonshire, June 7, 1761, died in London, Oct. 16, 1821. He learned the trade of a millwright, studied mathematics two years, settled in London in 1783, and engaged in the construction of steam engines and machinery. He planned and superintended the stone bridge at Kelso, below the junction of the Tweed and Teviot, the Waterloo and other bridges over the Thames at London, the Kennet and Avon canal from Bath

to Newbury, the London docks, the East and West India docks at Blackwall, the Plymouth breakwater, and many other great works.—GEORGE, his son (1791–1866), also a distinguished engineer, published "Experiments on the Strength of Materials," "The Frictions of Solids," and "The Frictions of Fluids." Sir JOHN (1794–1874), brother and partner of the preceding, knighted on the opening of the new London bridge in 1831, was the author of "The Theory, Formation, and Construction of British and Foreign Harbors" (2 vols. fol., 1854).

RENO, a S. county of Kansas, intersected in the N. E. corner by the Arkansas river, and watered by several of its affluents; area, 1,512 sq. m. It is not included in the census of 1870. Capital, Hutchinson.

RENOUARD, Antoine Augustin, a French bibliographer, born in Paris, Sept. 21, 1765, died at St. Valery, Dec. 15, 1853. He was originally a manufacturer of gases, but in 1797 became a bookseller and publisher in Paris, retiring in 1824. His principal works are: *Annales de l'imprimerie des Alde* (2 vols., 1803), which passed through several editions; *Annales de l'imprimerie des Estienne* (1837-'8; 2d ed., 1843); and valuable annotated catalogues.

RENSELAIR, an E. county of New York, bordering on Vermont and Massachusetts, bounded W. by the Hudson river, and drained by the Hoosick and Little Hoosick rivers, and Kinderhook creek; area, 690 sq. m.; pop. in 1870, 99,549. Two ranges of mountains, the Taghkanick and Petersburg, traverse it from N. to S.; they have an elevation of from 1,000 to 2,000 ft., with precipitous declivities, studded with numerous small lakes. The soil is generally hard and sterile, but much of it is under cultivation, yielding liberal crops. Several railroads pass through the county. The chief productions in 1870 were 5,527 bushels of wheat, 187,383 of rye, 211,968 of Indian corn, 717,845 of oats, 49,762 of buckwheat, 1,504,209 of potatoes, 108,214 tons of hay, 235,496 lbs. of wool, 1,271,128 of butter, 365,416 of cheese, 43,286 of hops, 774,773 of flax, and 54,513 of maple sugar. There were 9,372 horses, 16,813 milch cows, 1,358 working oxen, 8,585 other cattle, 54,928 sheep, and 9,276 swine. The county contained 792 manufacturing establishments, employing 15,588 hands, and having an invested capital of \$12,354,181, with annual products amounting to \$28,550,306. The principal manufactures are iron and iron ware of many kinds, agricultural implements, bells, cotton and woollen goods, brick, linen and paper collars, carriages and wagons, machinery, marble and stone work, flour, lumber, paper, and leather. Capital, Troy.

RENVILLE. I. A S. W. county of Minnesota, bounded S. W. by the Minnesota river, and drained by its branches; area, about 1,000 sq. m.; pop. in 1870, 3,219. The surface consists mostly of rolling prairies, and the soil is fertile. The chief productions in 1870 were 43,289

bushels of wheat, 6,537 of Indian corn, 27,659 of oats, 9,731 tons of hay, 1,735 lbs. of wool, and 40,185 of butter. There were 993 milch cows, 1,759 other cattle, 833 sheep, and 285 swine. Capital, Beaver Falls. **II.** A N. W. county of Dakota, bordering on British America, recently formed, and not included in the census of 1870; area, about 1,800 sq. m. The S. W. part is occupied by the Plateau du Coteau du Missouri; the rest is watered by Mouse river. The surface is generally undulating, and the county is well adapted for grazing.

RENEWICK. **I.** James, an American physicist, born in New York in 1792, died there, Jan. 12, 1863. He graduated at Columbia college in 1809, was professor of chemistry and physics there from 1820 to 1854, and in 1838 was appointed one of the commissioners to explore the N. E. boundary between the United States and New Brunswick. He was the author of "Outlines of Natural Philosophy" (2 vols. 8vo, New York, 1822-'3), the earliest extended work on that subject published in the United States; "Treatise on the Steam Engine" (8vo, 1830), translated into several languages; "Elements of Mechanics" (8vo, Philadelphia, 1832); and "Applications of the Science of Mechanics to Practical Purposes" (12mo, New York, 1840). He privately printed for the use of his classes "First Principles of Chemistry" and "Outlines of Geology" (1838), the latter preceding by several years any other school treatise on the subject. **II.** James, an American architect, son of the preceding, born in New York in 1819. He graduated at Columbia college in 1836, was an engineer on the Erie railway and the Croton aqueduct for about five years, and superintended the construction of the distributing reservoir. At the age of 23 he won in competition the commission for the building of Grace church, in Broadway, and has since built the new St. Patrick's cathedral in New York, Calvary church, the second Presbyterian church, the Smithsonian institution in Washington, various hospitals on Blackwell's, Ward's, and Randall's islands, and Vassar college.

REPLEVIN (law Lat. *re*, back, and *plegium*, pledge), a redelivery of a thing to the owner, upon pledges or security; the taking from some holder property which the taker claims, he giving back pledges to establish his right, or, if he fails in this, to return the property. The institution of this very important action is ascribed to Glanvil, chief justice to Henry II.; and it was originally the peculiar and exclusive remedy in cases of wrongful distress. The object was to prevent the beasts of the plough, cattle, and other goods of the tenant in arrear from being unjustly or excessively distrained by the landlord, lest, as Littleton observes, "the husbandry of the realm and men's other trades might thereby be overthrown or hindered." At the common law a distress (which implies both the thing taken and the manner of taking it) was considered merely as a pledge

or security for the rent, for damage feasant, or for service due from the tenant to his superior lord, and a means of enforcing its payment or performance. It could not be sold or disposed of by the distrainor, but he was compelled to hold it as a pledge until payment or other satisfaction was made. For this reason beasts of the plough and the tools of a man's trade could not be distrained, lest by depriving him of these he should also be deprived of the ability to redeem them; but the statute 2 William and Mary, 1, c. 5, authorized the distrainor, with the assistance of the sheriff, to have the distress appraised by competent appraisers, and sold for the highest price which it would bring, unless regularly replevied by the tenant or owner within five days after seizure. There were two ways in which a distress could be replevied, one according to the common law, and the other by a statute. The common law allowed the owner a writ *de replegiari facias*, which was sued out of the court of chancery and directed to the sheriff of the county in which the distress was taken, commanding him to redeliver it to the owner upon receiving sufficient sureties therefor, and afterward to determine the ownership and do justice as to the matter in dispute between the parties, in his county court. The statute of Marlbridge, on the other hand (52 Henry III., c. 21), provided that, without suing out a writ, the sheriff or any of his deputies (of whom four were appointed in each county for the express purpose of making replevins) should, immediately upon complaint being made to him, proceed to replevy the goods. The owner was then obliged to give satisfactory security to two ends: first, *plegios de proseguendo*, or pledges to prosecute his suit to final judgment; and second, *plegios de retorno habendo*, or pledges to return the distress again to the distrainor, if the right should be determined against him. These pledges were discretionary, and the sheriff was responsible for their sufficiency; and in addition to them the statute required a bond with two sureties for double the value of the goods taken, also conditioned to prosecute the suit and return the goods. This bond was to be assigned to the avowant or person making cognizance, on request to the officer, and if forfeited it could be sued by the assignee. If the sheriff neglected to take a bond, or if he accepted insufficient pledges, the party might have an action against him and recover double the value of the goods distrained, but no more. The owner of goods distrained might replevy them although his grant by deed contained a special condition that the distress should be irreplevisable, and that the landlord should keep it as a gage or pledge until the rent were paid; because it was held to be incompatible with the nature of a distress that it should be irreplevisable. The sheriff, on receiving the required security, was at once to cause the distress to be returned to the party from whom

it was taken, unless the distrainer himself claimed the goods as his property; for if they were, the law permitted him to keep them, irrespective of the manner in which he had regained possession. If therefore the distrainer claimed any such right or property, the party replevying was obliged to sue out another writ called a writ *de proprietate probanda*, by which the sheriff was to determine, by an inquest, who was really the owner of the property before the distress was levied thereon. If it was decided against the claim of the distrainer, the sheriff proceeded to replevy as if no such claim had been made; but if his claim was found to be good and valid, the sheriff could proceed no further, but was to return the claim to the court of king's bench or common pleas, to be there prosecuted and finally decided. The goods, in ordinary cases, being delivered back by the sheriff to the party replevying, he was then compelled to prosecute his suit or action of replevin in the county court, though either party might remove it to the superior court of king's bench or common pleas; and indeed, to save trouble and delay, it was usually carried up in the first instance to the courts of Westminster hall, because if, in the course of proceeding in the county court, any right of freehold came in question, the sheriff could proceed no further. Upon action being brought, the distrainer, who was now the defendant, made avowry; that is, he avowed taking the distress, and set forth the right in which and the cause for which he took it, as for rent in arrears, damage done, or other cause; or if he justified in another's right, as bailiff or servant, he was said to make cognizance; that is, he acknowledged the taking, and claimed that it was legal as being done at the command of one who had a right to levy the distress; and upon the legal merits of this avowry or cognizance the cause was determined. If the action was decided in favor of the plaintiff, and the distress declared to be wrongful, he was entitled to keep the goods which he had already got back into his possession, and in addition should recover damages for the wrongful seizure and detention; but if the defendant prevailed, he should have a writ *de retorno habendo*, by which the distress was returned into his possession irreplevisable, to be sold or otherwise disposed of, as if it had never been replevied. If the debtor had in the mean time disposed of or concealed the distress, so that it could not be found, execution issued against his other goods, and for want of them against his body in the nature of a writ of *capias*. While distresses continued to be held as mere pledges, if the former owner, after judgment against him, offered the distrainer the arrearages or other damages due, and he refused thereupon to deliver up the distress, the plaintiff might bring an action of detinue, and by that means recover its possession. If, while a replevin for a former distress was pending, a man distrained again for the same rent or service, the party

was not obliged to bring another action of replevin for the second distress, but could have a writ of recaption and recover the goods with damages for the distrainer's contempt of the process of the law.—Formerly a mere possessory right was not sufficient to entitle a party to maintain replevin; but now it is sufficient if the plaintiff can prove a general or special property in the goods, with the right of immediate and exclusive possession, either as mortgagee, owner, agent, or bailee, without actually having such possession at the time. Though replevin was formerly confined to cases of wrongful distress, it is now the proper form of action by which to recover the specific thing taken, in all cases where goods have been tortiously taken or detained, whether by distress or in any other manner, together with damages for the detention, unless the taking and detention can be justified or excused; and it is one of the most important and frequently used modes of legal remedy. The forms and manner of proceeding, with some slight alterations, remain the same now as formerly, as far as the redelivery of the goods to the party claiming them, the giving of bonds with sureties in double the value of the goods, the prosecution of the action, and the final judgment and execution are concerned. This action will lie for goods taken in execution, provided the person bringing it against the officer who takes the goods from another by virtue of the execution has a property, general or special, in them, and a right to reduce them into his actual possession; but no replevin will lie in favor of the defendant in execution or attachment, unless the goods seized are exempted by law from being so taken. In some cases replevin for property taken for taxes is forbidden.

REPOUSSÉ. See supplement.

REPTILES (Lat. sing. *reptilis*, from *reperere*, to creep), a class of vertebrated animals intermediate between fishes and birds. Linnæus united the oviparous quadrupeds and the serpents of Aristotle under the erroneous name of *amphibia*; until within a recent period batrachians, as well as serpents, lizards, and tortoises, were included among reptiles, but now the first are regarded as a distinct class. As thus limited, reptiles do not undergo metamorphosis, are always air breathers, though cold-blooded, and have neither mammæ, hair, nor feathers. By the first two peculiarities they are distinguished from fishes and batrachians, and by the third from mammals and birds. Although they breathe air by lungs like birds and mammals, the pulmonary circulation is incomplete, only a part of the blood being sent to them, and, from the communication of the ventricles of the heart or the great vessels, a mixed arterial and venous blood, principally the latter, is sent to the organs. Reptiles have been divided into chelonians or tortoises, saurians or lizards, and ophidians or serpents, whose characters are given under their respective orders, families, and popular names. The various sys-

tems of classification will be found under HERPETOLOGY; the batrachians have been treated under AMPHIBIA, and the anatomical peculiarities of the order under COMPARATIVE ANATOMY. The number of species of reptiles is about 2,000, or less than that of mammals or birds; most of them are terrestrial, but some (as the dragons) can sustain themselves in the air like the flying squirrels, and the extinct pterodactyl probably winged its way like the bats; some live habitually in the water, swimming by means of flattened fins (as the turtles), or by a laterally compressed tail (as in crocodilians); the amphibana and other ophisaurians dwell in subterranean burrows. They present every degree of speed, from the agility of the lizard to the slowness of the tortoise; some are fitted for running over dry sand, others for climbing trees, others for ascending smooth surfaces; the limbs are not generally adapted for rapid or graceful motions, being short, almost at right angles with the spine, and hardly raising the body during locomotion enough to prevent the ventral surface from dragging on the ground; the anterior limbs are the shortest, and the knees and elbows are constantly flexed and far apart longitudinally; the feet are not adapted for prehension (the chameleon excepted), so that they display little skill in preparing retreats for themselves or places for their eggs. They are naturally cold-blooded for reasons given below, and are found in greatest abundance and of largest size in warm climates; under the influence of cold they pass into a lethargic state, and according to Humboldt a similar condition befalls the South American crocodilians during the hottest season of the equatorial regions. The tortoise and the crocodile are sufficiently protected against ordinary enemies; the lizard darts into its hole, perhaps at the expense of a part of its tail, which is soon reproduced; the great boas prevail over every foe but man; many serpents are armed with poisonous fangs, rarely used however except on the defensive; some are covered with bristling spines, like the horned lizards, and are thus saved from predaceous animals. They are of great use to man in destroying noxious insects and other animals; some, like the chelonians, furnish a wholesome and abundant food, and others supply various articles useful in the arts. They are preyed upon by carnivorous birds, as eagles, storks, cranes, and the ibis, and by such mammals as the ichneumon, hog, and the smaller carnivora; they are themselves essentially carnivorous, and feed on living prey which they swallow whole, but the marine turtles are principally herbivorous.—The osteology of reptiles has been given sufficiently in the various articles above referred to. Except in chelonians, the form is generally elongated, more or less cylindrical, with a very long tail; the feet are absent in serpents and in some saurians, and four in the others; the skeleton is always osseous, the cranium small,

and the facial bones and jaws greatly developed, the latter usually armed with sharp, hooked teeth; the toes are freely movable, and usually with strong claws, webbed in the crocodiles and turtles. The body is covered with scales, generally appendages of the true skin; the overlying epidermis is cast off periodically; the scales are converted into bony plates in the chelonians and crocodiles, and in lizards and serpents are often brilliant with metallic reflections; in the chameleon, anolis, &c., the surface modifications of the skin present very rapid changes of color, sometimes expressing the anger or fear of the animal, and in some cases enabling them to avoid detection by their enemies. The muscles of reptiles are red, though paler than in mammals and birds; they preserve their irritability for a long time after the death of the animal, in chelonians even after many days; tortoises have been known to live for 18 days after the removal of the brain, groping blindly about. The brain is small, with cerebrum, cerebellum, and medulla oblongata; they have also a spinal system of nerves, and a sympathetic or ganglionic chain; in most the spinal marrow is relatively much more developed than the brain, the latter being smooth, without convolutions, the cerebral lobes being the largest; the cerebral hemispheres contain lateral ventricles, and are larger than the optic lobes, which in fishes constitute the greater part of the brain; there is no *pons Varolii*, and the cerebellum is more developed than in fishes. Life seems in a remarkable degree independent of the brain, the class rather vegetating than living, and being comparatively insensible to pain; they grow slowly and live long, and are exceedingly tenacious of life; the intelligence is hardly greater than in fishes. The sense of touch is dull, both active and passive, and whether exercised by the skin, toes, lips, tongue, or tail; taste must also be dull, as the food is swallowed without mastication, and the sense of smell must be still less. The organ of hearing is less developed than in birds and mammals; there is no external ear; the tympanum, where it exists, is bare and almost external, and the internal ear is less developed than in fishes. The eyes are usually small, occasionally absent, flat, with incomplete bony orbits, with lids (except in serpents), and with lachrymal glands. The nasal cavities are large, and always communicate with the mouth, and in the crocodiles are very far back. The lungs are sometimes large, extending even through the whole length of the ventral cavity, which has no diaphragm; in the long-bodied snakes only one lung is active, the other being very rudimentary or absent; these organs are comparatively free, the trachea not divided into bronchi, and the air cells few, large, and freely communicating with each other; in lizards and serpents the ribs serve for respiration, and in tortoises the scapular arch performs the office of ribs, according to Van der Hoeven, respiration not

being effected by deglutition. Only a small portion of the blood is sent to the lungs, and this is feebly oxygenated, as the respiration is performed slowly and the lung is of loose texture and small capacity; hence a low degree of animal heat, languid movements, and a slow performance of the nutritive functions. They have no true epiglottis and no proper voice, though some emit a hissing sound (as the ophidians) formed in the mouth. The heart has four cavities, but the ventricles communicate, except in the crocodilians, where an admixture of the arterial and venous bloods takes place in the great vessels; there is, therefore, a partial circulation independent of respiration, enabling them to remain long under water and in irrespirable gases. The lymphatic system is greatly developed, having regular pulsating organs or lymphatic hearts for the propulsion of their fluid. Reptiles eat and drink comparatively little, and are able to go a long time without food; not having movable and fleshy lips, they cannot perform the act of suction, as was once popularly believed of serpents; the mouth is generally large, and the lower jaw articulated by a distinct bone, the homologue of the *os quadratum* of birds. The tongue is generally free, and the œsophagus very wide and distensible to accommodate large prey; the intestine is short and straight in proportion to the carnivorous disposition, being longest in the herbivorous chelonians and shortest in the snakes; there is a certain division into small and large intestine, though the latter in most is properly the rectum; the alimentary canal opens below into a cloaca, or cavity common to the digestive, urinary, and reproductive organs, as in birds; all the nutritive elements are extracted from the food, the indigestible matters being ejected in a mass at long intervals; the vent is transverse in snakes and lizards, but longitudinal in chelonians and crocodiles, corresponding to remarkable differences in the male external reproductive organs, these in the former being double and placed in a cavity behind the anus, and in the latter single and within the cloaca. Salivary glands, which are absent in fishes and batrachians, are present in reptiles; the liver is always present and large, receiving much venous blood, especially that from the posterior part of the body; the gall bladder is commonly found, though small; the spleen is generally very small, removed from the liver and stomach, rounded, and deep red; the pancreas is constant, often large at the beginning of the intestine, and of various forms; the kidneys are situated along the spine, showing no distinction of cortical and medullary portions; the ureters open into the cloaca, and the urine is a whitish mass, more or less hard, containing salts of lime and ammonia; the supra-renal capsules are usually present, small, and often remote from the kidneys; there are one posterior and two anterior venæ cavae. The power of reproducing lost parts is less than in batra-

chians, and is noticed especially in the tails of certain lizards and serpents. In this class there is no durable union of the sexes as in birds and mammals, and nothing which exerts any influence on the social condition of the individuals; after the instinctive act of reproduction they separate and become perfect strangers. Most are oviparous, leaving their eggs to be hatched by the heat of the sun, and the young when born are able to provide for themselves and are generally indifferent to the mother; the female rarely makes a nest, but deposits her eggs in a safe, warm, and dry place; crocodiles and some lizards watch in the neighborhood of the place where their eggs are concealed, and the python has been seen in menageries coiling herself around her eggs in a conical form, closing the top with her head. Some of the serpents are viviparous, the young being so far developed before the exclusion of the eggs as to be born alive; in the viviparous snakes the young are said to take refuge within the mouth of the mother. The eggs have generally a more or less calcareous shell, globular or rounded equally at each end; in serpents they are often joined together in chaplets; their number varies from 20 to 100. The embryo is completely enveloped by the amnios, and after it has attained a considerable degree of development a second membranous covering appears, for the first time in vertebrates, the allantois, richly supplied with vessels and enclosing embryo and amnios.—As reptiles are generally despised and hated by man, and comparatively little under his influence, their original geographical distribution has been but slightly changed by him. Most of the serpents, especially the venomous kinds, belong to warm regions.—The secondary geological epoch, comprising the trias, Jurassic, and chalk, has been called the age of reptiles; during this period air-breathing animals first appeared in considerable numbers, and reptilian forms predominated. Reptiles are connected with birds, especially those of the former called *symphy-poda* by Cope; dinosaurians, progressing by leaps, with very small anterior limbs, have made many of the bird-like tracks described by Hitchcock in the sandstone of the Connecticut valley. The gigantic and uncouth forms of the secondary age had disappeared in the tertiary, and the reptiles of the latter were more like the present ones, except in geographical distribution, and were in about the same proportion to the rest of creation as now. The study of fossil reptiles shows the limited duration of species; before the diluvial epoch there is not a single reptile that can be referred to living species and hardly to an existing genus; the reptiles of each age, triassic, Jurassic, and cretaceous, have a special facies, unlike any which preceded or followed them; the difference between the fossil and living forms is always greater as we go back in time. This study also proves that the temperature of the earth has varied, as the great reptiles above named

lived in parts of Europe nearer the frigid than the torrid zone. All the fossil forms, however odd, were constructed on the same reptilian vertebrate type as at present, in some instances with ornithic (pterodactyl) or mammalian affinities (ichthyosaurus). In the most ancient fauna of reptiles, chelonians and saurians, the highest in the class, are represented, and some forms then existing were in certain respects more perfect, or at any rate more complex, than some present members of the class; each fauna had its type of perfection, without regard to the superiority or inferiority of that which preceded or followed it; we find no transition species leading to or from ichthyosaurus, plesiosaurus, pterodactyl, and the like, unless we ascend to cetacean mammals in the first and to bats in the last. Reptiles (including batrachians even) are very rare, and to some questionable, in the Devonian; there are a few amphibians in the carboniferous; the class abounds in the divisions of the trias, and is most numerous in the Jurassic, becoming less abundant in the oolite and chalk. For details on fossil reptiles see the various articles on the genera above mentioned. Professors Cope and Marsh have described several new forms of reptiles from the western territories, in the "American Naturalist," "Proceedings of the Academy of Natural Sciences," Philadelphia, and the "American Journal of Science."

REPTON, Humphry, an English landscape gardener, born in Bury St. Edmund's, May 2, 1752, died in Essex, March 24, 1818. Having failed in mercantile business, he adopted the profession of landscape gardening, and was henceforth uninterruptedly prosperous. At the period of his death there was scarcely a county in England which did not have some "places" adorned by his skill. His works on landscape gardening, with an account of the author's life, were reprinted by J. C. Loudon (8vo, 1840).

REPUBLIC, a N. county of Kansas, bordering on Nebraska, and intersected by the Republican river; area, 720 sq. m.; pop. in 1870, 1,281. It has an undulating prairie surface. The chief productions in 1870 were 8,626 bushels of wheat, 16,820 of Indian corn, 4,705 of potatoes, 13,790 lbs. of butter, and 1,079 tons of hay. There were 463 horses, 1,039 cattle, 325 sheep, and 181 swine. Capital, Belleville.

REPUBLICAN RIVER. See KANSAS, vol. ix., p. 747.

RESACA DE LA PALMA, a ravine, as its name imports, thickly grown with palm trees, that crosses the Matamoros road, in Texas, about 3 m. from the place where the road opens upon the Rio Grande opposite Matamoros. In a battle fought here, May 9, 1846, 2,000 United States troops under Gen. Zachary Taylor defeated 6,000 Mexicans under Gen. Arista.

RESHID PASHA, Mustapha Mehemed, a Turkish statesman, born in Constantinople in 1802, died there, Jan. 7, 1858. He was educated by Ali Pasha, who had married his sister, and was

governor of a province in Asia Minor. When Ali as grand vizier was sent to suppress the Greek insurrection in 1822, Reshid accompanied him; and in the campaign against the Russians in 1828-'9 he was private secretary to Selim Pasha. He took part in the negotiation of the treaty of Adrianople, and was sent on a diplomatic mission to Mehemet Ali, pasha of Egypt. In 1833 he assisted in negotiating the treaty of Kutaieh. In 1837 he became minister of foreign affairs, but held the post only for a year, going as special envoy to London and Paris. In 1839, after the reopening of the Egyptian war, he was recalled by Sultan Abdul-Medjid, who had succeeded Mahmoud II., to take charge again of the foreign ministry. He caused the promulgation of the *hatti-sherif* of Gulhane, raising the Christians to a civil equality with the Mussulmans, and brought about the quadruple alliance by which Egypt was compelled to evacuate the Turkish provinces. In 1841 he was again envoy to England and France. He was made grand vizier in 1846, but lost his post six years later, and retired to private life, only to be recalled very soon to his high office, which he was compelled to resign in 1857 through an illness that shortly proved fatal. His influence was always exerted for the maintenance of peace. He discountenanced polygamy, and was distinguished for his literary and scientific attainments.

RESHT, or **Reshd**, a city of Persia, capital of the province of Ghilan, about 5 m. inland from the bay of Murd-ab or Enzeli in the Caspian sea, and 142 m. N. W. of Teheran; pop. about 20,000. It is well paved, and the houses are uncommonly neat and of superior construction. There are extensive bazaars, and a large trade is carried on in raw silk, embroideries, fruits, and fish. It has of late greatly decreased in importance and population, partly from frequent visitations of cholera. The population embraces Persians, Russians, Turks, Armenians, Jews, and Hindoos, and the streets and bazaars swarm with fakirs, dervishes, and other mendicants. Enzeli, at the entrance of the gulf of Murd-ab, is its port, but the sea is there so boisterous and the surf so high that the steamers plying between Astrabad and Baku are at times not able to land their passengers. Treaties of peace between Persia and Russia were signed at Resht in 1729 and 1732.

RESINA (anc. *Retina*), a town of Italy, in the province, on the gulf, and 6 m. S. E. of the city of Naples, at the W. base of Vesuvius; pop. about 12,000. It covers a large part of the ruins of Herculaneum, and the sinking of a well here in 1709 led to the excavation of relics and to the first discovery of the real site of the latter city. Resina is the place from which the ascent of Vesuvius is generally made, and has many villas, which extend almost to the neighboring Portici. The most celebrated of these is the villa La Favorita, built on the lava of 1631, and formerly belonging to the prince of Salerno. Silk is woven

to some extent, and the renowned *Lacrymæ Christi* wine is produced in the vicinity. The ancient *Retina* was supposed to have been a naval station and the port of *Herculeaneum*.

RESINS, a class of proximate principles existing in almost all plants, and appearing upon the external surface of many of them in the form of exudations; also the oxidized and concentrated juice of several species of coniferous and other trees. They are produced by certain families in considerable abundance, and in smaller quantities by a very large number of plants. When not exuding spontaneously, they often escape from punctures in the bark made by insects, or may be obtained by making incisions into the wood. They appear in the form of a viscid liquid consisting of the resin in solution in the essential oil of the plant. (See **BALSAMS**, and **TURPENTINE**.) It is possible that the resins never exist as such in plants, but it is certain that in the majority of cases they are formed by the oxidation of the essential oils contained in the plants. They are sometimes extracted by boiling the sawdust of the wood with alcohol, from which they are precipitated by the addition of water, and as the alcohol is distilled off the particles agglomerate. Resins are so variously composed of numerous principles, that no little diversity is observed in their general properties, and they are therefore arranged by different authorities under several heads. 1. Resins which exude spontaneously from plants, or from incisions in the stems and branches, and harden on exposure to air; these sometimes contain considerable quantities of gum or mucilage (gum resins), or of volatile oil (balsams). This class includes: *a*, resins containing benzoic or cinnamic acid, such as benzoin, storax, and balsam of Peru or tolu; and *b*, resins not containing those acids, such as *asafetida*, *copaiba*, *copal*, *jalap*, *lac*, *mastic*, and common *turpentine*. 2. Oxidized fossil resins, such as *amber*, and others occurring in beds of coal or lignite. 3. Resins extracted from plants by alcohol, such as the resins of *cubebs*, *buchu*, and *squills*. In general the resins are solid bodies of vitreous fracture, and brittle, so as to be readily pulverized when cold. Others are soft and greasy, and some are elastic. They are usually transparent or translucent, rarely colorless, but either brown, red, or green. Their specific gravity is from 0.92 to 1.2. They occasionally have a decided taste or odor, derived from some essential oil or other foreign substance present; and to the same cause is probably owing the occurrence of some of the resins in a soft state. The solid resins are non-conductors of electricity, and by friction they assume the electric state known as negative or resinous. They melt at a moderate heat, and form a thick viscid liquid; on cooling this becomes a shining solid mass of vitreous fracture, which occasionally, when scratched with a sharp point after sudden cooling, flies off into pieces like *Prince Rupert's drops*. They readily take fire, and

burn with a white or yellow flame and much sooty smoke. Some are soluble in ether, and others in volatile oils, boiling alcohol, or fixed oils with the aid of heat. The alcoholic solutions of some of them possess acid properties; others are neutral. These acid resins combine with the alkalies and form lyes, which when agitated produce a lather like that of soap, differing from it, however, in not being precipitated or becoming hard on addition of common salt. (See **ROSIN**.) Many of the natural resins are mixtures of two or more resins, which may often be separated from each other through their different solvents. When decomposed at a high heat in close vessels, the resins are resolved into carbonic acid, different gaseous hydrocarbons, empyreumatic oil, a little acidulous water, and a very little shining charcoal.—Chemically the resins consist of carbon, hydrogen, and oxygen, often in such proportions as to indicate a product of the oxidation of a multiple of C_6H_8 . As they slowly absorb oxygen, with or without evolution of carbonic acid or water, or both, they are very unstable. Very few can be crystallized, and hence it is only with extreme difficulty that they can be obtained in a condition of purity. In the case of gamboge, myrrh, and others less frequently met, an atom of oxygen appears to be substituted for two atoms of hydrogen in the essential oil; but mastic, elemi, and others appear not only to exchange hydrogen for oxygen, but also to take up water. Some of them may therefore be considered to be oxides and others hydrates of the essential oils. As the resins have not yet been formed artificially from the essential oils, these views have not been proved correct.—Solutions of resins in alcohol, oil of turpentine, and fixed drying oils form varnishes. Spirit varnishes are at the same time the most brilliant and the most brittle; their elasticity may be increased by the addition of oil of turpentine. The resins commonly used for varnishes are copal, elemi, lac, mastic, and sandarach.

RESPIRATION (Lat. *respirare*, to breathe), the function by which oxygen is absorbed by the living organism for the maintenance of vitality, and by which carbonic acid is discharged as a product of disintegration or waste of the materials of the tissues. Respiration in some form is common to all living beings. Even in vegetables none of the more active phenomena of life can go on unless the plant be constantly supplied with oxygen; and the intensity with which these phenomena are manifested is in proportion to the rapidity with which oxygen is absorbed by its tissues and carbonic acid exhaled. In animals the process of respiration is still more marked; and it is more active in the warm-blooded birds and mammalia than in the cold-blooded reptiles and fishes. Animals which inhabit the water and breathe by gills absorb through them the oxygen which is in solution in water, and discharge carbonic acid by the same

channel. In man and the air-breathing animals, the atmospheric air, which consists of 21 volumes of oxygen mixed with 79 volumes of nitrogen, is drawn by the movement of inspiration into the lungs, and discharged by the movement of expiration. During its stay in the pulmonary cavities it is changed in composition. The first and most important change is a diminution of its oxygen. As a general rule, the air loses in this way, by the effect of a single respiration, 5 per cent. of its volume in oxygen. As, on the average, 20 cubic inches of air are taken into and discharged from the lungs by each respiratory act, the quantity of oxygen thus removed from the air at each respiration is one cubic inch. The movements of respiration follow each other usually at the rate of 18 or 20 a minute, and are accelerated by any active muscular exertion. The total quantity of air thus used for respiration in 24 hours is not far from 350 cubic feet; and accordingly the daily quantity of oxygen taken from the air and consumed by a healthy adult man is about $17\frac{1}{2}$ cubic feet, or more than four times the volume of the whole body. The amount of carbonic acid given off at each respiration in man is rather less than one cubic inch. The expired air usually contains about 4 per cent. of its volume of carbonic acid; this amounts, under ordinary circumstances, to about 14 cubic feet a day. Although the volume of the carbonic acid exhaled is less than that of the oxygen absorbed, its weight is considerably greater; the whole amount of oxygen consumed during 24 hours being about 10,000 grains, or rather less than $1\frac{1}{2}$ lb. avoirdupois, while that of carbonic acid exhaled during the same time is over 11,000 grains, or rather more than $1\frac{1}{2}$ lb. A certain amount of watery vapor is discharged with the expired breath. This vapor is invisible at moderately warm temperatures, since it is then in the completely gaseous form; but if it be cooled below a certain point, as by coming in contact with cold air or cold metallic or glass surfaces, it becomes condensed, and is then rendered visible as a cloudy vapor or as a deposit of moisture. The amount of watery vapor thus discharged with the breath during 24 hours is, on the average, rather more than one pound avoirdupois. The oxygen absorbed from the air in the lungs is taken up by the blood, and carried away in the arterial circulation. At the same time the blood loses the dark purple color which it presents before entering the lungs, and assumes a bright scarlet hue. This process is the most immediate effect and the main purpose of respiration, and constitutes the principal distinction between arterial and venous blood. Venous blood is dark because it is deficient in oxygen; arterial blood is bright red because it contains an abundant supply of this necessary ingredient. The brilliant color of arterial blood is therefore an indication that it has absorbed its requisite quantity of oxygen, and is fit to provide for

the stimulus and nutrition of the tissues. As the arterial blood is disseminated throughout the body and comes in contact with the substance of the tissues, it gives up to them its oxygen and resumes a dark purple hue; it is thus reconverted into venous blood. At the same time it absorbs from the tissues a certain proportion of carbon, which has been set free in their substance, and, loaded with this product of disintegration, it returns to the right side of the heart, to be thence distributed to the lungs. There are accordingly two opposite and complementary changes taking place in the blood, during its passage through the lungs and the tissues respectively.—Since the air by respiration is deprived of a portion of its oxygen and loaded with carbonic acid, it will be incapable of supporting respiration continuously, unless renovated as rapidly as it is consumed. This renovation is provided for by the alternate movements of inspiration and expiration, by which the air already in the lungs, which has given up its oxygen to the blood and become mingled with carbonic acid, is discharged externally and replaced by a fresh supply. The expired air is at once disseminated in the external atmosphere and carried away by the currents which are always in motion; so that, while in the open air, the lungs are constantly supplied with the materials of respiration in a state of purity. But if respiration be carried on in a confined space, the oxygen of the air gradually diminishes in quantity, and carbonic acid accumulates in a corresponding degree. The air is thus at the same time impoverished and vitiated, and after a time its deterioration becomes so marked that it is no longer capable of supporting life. Air is completely unfit for respiration when its natural proportion of oxygen has been reduced one half, and when it has become contaminated with carbonic acid to the extent of one fifth of its volume. But although the most serious results follow when the air has been vitiated to this extent, a much smaller amount of deterioration is unwholesome. This is of the greater importance because, besides its loss in oxygen and its mixture with carbonic acid, the air in respiration is also contaminated by certain organic vapors which may be distinguished by their odor, and which are exhaled in the breath at the same time with the carbonic acid.

RESTIGOUCHE, a N. county of New Brunswick, Canada, bordering on Quebec and the bay of Chaleurs; area, 2,889 sq. m.; pop. in 1871, 5,575, of whom 2,695 were of Scotch, 1,143 of French, 1,133 of Irish, and 483 of English origin or descent. It is intersected by branches of the Restigouche river, which partly separates it from Quebec. The surface is diversified with mountains and valleys. The soil is well timbered; large quantities of timber are exported. Capital, Dalhousie.

RESTIGOUCHE, a river of Canada, rising in Madawaska co., in the N. W. part of New

Brunswick. It flows N. E. to the mouth of the Mistouche, and thence a little N. of E., forming the boundary between New Brunswick and Quebec, to the bay of Chaleurs, which it enters at Dalhousie, N. B. It is 3 m. wide at its mouth, and is navigable by the largest ships for 18 m. to Campbellton, N. B. The scenery along its course is grand and beautiful. With its tributaries it drains an area of about 5,000 sq. m. of fertile and well timbered country. It abounds in salmon. Its chief tributaries are the Wetomkegewick, Mistouche, and Matapediac from the north, and the Upsalquitch from the south.

RETHEL, Alfred, a German painter, born in Aix-la-Chapelle in 1816, died in Düsseldorf, Dec. 1, 1859. He studied under Schadow and Veit, visited Italy, and became insane in 1852. His principal works are the frescoes illustrating the history of Charlemagne in the town hall of Aix-la-Chapelle, his designs of "Hannibal crossing the Alps," and those of the "Dance of Death." His large cartoons of "Charlemagne at the Council of Frankfort" and "The embassy of the Caliph Haroun al-Rashid to Charlemagne" are at Düsseldorf.

RETINA. See EYE.

RETINISPORA (Gr. *ῥηίνη*, resin, and *σπορά*, seed), a name proposed by Siebold and Zuccarini in their *Flora Japonica* for a genus of *conifera*, which has been accepted until within a few years; but it has since been shown that the resinous coating of the seed, all that distinguishes it from *cupressus*, is found on undoubted species of that genus; hence it follows that the *retinisporas* cannot be kept distinct from the *cypresses*. As it is very difficult to supersede an established name, no doubt these Japanese species, having been introduced as *retinisporas*, will long retain that name in the catalogues and among arboriculturists. For their botanical characters, see *CYPRESS*. The species and varieties, though of comparatively recent introduction, have proved especially suited to the climate of the northern states. In Japan they are 100 ft. or more high, but in our gardens they are thus far only 1 to 6 or 8 ft. high. Like the *arborvitæ* and related plants, the foliage assumes very distinct forms, according to the age of the tree; and some good observers are disposed to regard the 15 or 20 named sorts of our gardens as all forms of a single species. For small places, these plants are especially valuable; they naturally assume a good form, and may be cut into any desired shape; they are generally upright, but there is one positively pendulous; some have the leaves small, blunt, and scale-like, others sharp and spreading; there are the darkest greens, and varieties with silver and golden variegation, and a collection of these forms presents wide contrasts in habit and color. The plants are for the most part propagated readily from cuttings; these are taken in the autumn, set in sand at a greenhouse temperature all winter, and as the heat increases in

spring root rapidly. The leading varieties are here enumerated by the names given in the catalogues, without reference to botanical accuracy. *Retinispora obtusa* has very dark green, small, blunt, appressed leaves, and there are several varieties. *R. pisifera* is more slender, and has a golden and silver variety. *R. ericoides* is a handsome heath-like plant. *R. lycopodioides* is much like a club moss. *R. filicoides* has fern-like branches. *R. plumosa* is one of the most valued of all, remarkably compact, with very numerous small branchlets which give the tree a plume-like appearance; the golden variety of this, *R. plumosa*, var. *aurea*, is of great beauty, and is destined to be one of the most popular of all conifers; it has the plumose habit of the green form, but the branchlets and all the spray are of a bright golden hue, and hold this color during the winter months; being easily propagated, it may be used for edgings and for a great variety of ornamental planting.



Plumy Retinispora (*Retinispora plumosa*).

RETORT. See DISTILLATION, and GAS.

RETRIEVER, a name given to several breeds of sporting dogs, from their being taught to retrieve or recover game which has fallen be-



Retriever.

yond the reach of the sportsman, or where he does not choose to go for it. The largest and best known is a cross between the Newfound-

land dog and the setter, best for game as large as a hare or pheasant; it stands nearly 2 ft. high, with powerful frame and stout limbs; the hair is moderately long and curly, and should be black; the sense of smell is very acute. They are very difficult to train. The smaller retrievers are a cross between the water spaniel or beagle and the terrier, smooth English or rough Scotch; they are less noisy and more companionable than the larger breed.

RETZ, Gilles de Laval, seigneur de, marshal of France, born about 1396, put to death in 1440. Under Charles VII. he distinguished himself in the war against the English, and fought at the side of the maid of Orleans. Money troubles obliged him to retire to his castle near Nantes. In consequence of rumors of shameful deeds practised by him, the bishop of Nantes summoned him to be tried before a mixed commission. It was proved that during 14 years the seigneur de Retz had enticed into his castle several hundred children, had practised magic, and had paid worship to the devil, in which his victims were obliged to take part as priests and priestesses. He was handed over to the civil power, and by a decree of Oct. 25, 1440, he was condemned to the stake, but, as a noble, was strangled.

RETZ, Jean François Paul de Gondl, cardinal de, a French politician, born at Montmirail in 1614, died in Paris, Aug. 24, 1679. He was a younger son of Philippe Emmanuel de Gondi, the general of the galleys under the reign of Louis XIII., and was intended for the church; but, with the design of establishing a reputation that would debar him from that employment, he entered on a career of intrigue and licentiousness, participating in every conspiracy against Richelieu. His family proved immovable, and at length he turned his attention to theological studies. He took rank among the most distinguished members of the church, and when not 30 years old became coadjutor to his uncle the archbishop Henri de Gondi. His winning manners, eloquence, and seeming Christian virtues secured for him unparalleled popularity among the Parisians. When the troubles of the Fronde broke out, he offered his services to the regent, Anne of Austria; but being coldly received, he used his popularity to cause the people of the metropolis to rise in arms against Mazarin, and became in effect the leader of the revolt. In 1651 he secured a cardinal's hat through his temporary alliance with the court, but he finally lost credit with all parties. Previous to the termination of the troubles, he was arrested by order of the queen, and was first taken to Vincennes, then to the castle of Nantes, whence he escaped. He took refuge in Spain, then in Italy, where his rank as a cardinal and his dignity of archbishop of Paris, in which he had nominally succeeded his uncle in 1654, secured him some respect. His return to France was permitted in 1661, but on condition of resigning his archbishopric, which he exchanged for

the abbacy of St. Denis, the richest preferment in France. He now gave up politics entirely, lived for the most part on an estate in Lorraine, and paid up his old debts, which amounted to more than 3,000,000 livres. His personal memoirs were printed for the first time in 1717 (3 vols. 12mo, Nancy), and have been often reprinted, with the addition of those of Guy-Joly and the duchess de Nemours, by which they are completed. They are included in Petitot's and Michaud and Poujoulat's *Collections de mémoires pour servir à l'histoire de France*. The most complete edition is that of Aimé-Champollion (4 vols. 12mo, 1859), with annotations and index.—See also *Œuvres du cardinal de Retz*, edited by Alphonse Feillet (vols. i. and ii., Paris, 1872).

RETZSCH, Friedrich August Moritz, a German designer, born in Dresden, Dec. 9, 1779, died near that city, June 11, 1857. He studied at Dresden, and in 1824 was appointed professor of painting there. His reputation rests upon his outline etchings illustrating "Faust" and the ballads of Goethe, Schiller, and Bürger, and Shakespeare's plays.

REUCHLIN (Hellenized into **CARNIO**), **Johann**, a German scholar, born in Pforzheim in 1455 (Feb. 22, according to Geiger), died in Stuttgart, June 30, 1522. On account of the sweetness of his voice he was admitted into the chapel of the margrave of Baden, and he was chosen by that prince to accompany his son Frederick in 1473 to the university of Paris. At the age of 20 he taught at Basel philosophy and Greek and Latin. He studied law in Orleans, and in 1481 was made teacher of jurisprudence and belles-lettres in the university of Tübingen. He received from the emperor Frederick III. the title of imperial councillor, and was employed in diplomacy. After the death of his patron Duke Eberhard of Würtemberg he went to the court of the elector palatine Philip at Heidelberg, where he made valuable additions to the library; and when the elector fell under the papal ban, Reuchlin went to Rome and obtained his absolution. For 11 years he was president of the Swabian confederate tribunal, but found time for the study of the eastern languages, and was constantly collecting Greek and Hebrew manuscripts. About 1509 a converted Jew named Pfefferkorn persuaded the inquisition of Cologne to solicit from the emperor Maximilian an order that all Hebrew books with the exception of the Bible should be burned. The emperor yielded, but subsequently asked the opinion of Reuchlin, who remonstrated strenuously, and the order was superseded. The inquisitors raised a furious cry against Reuchlin, charging him with being secretly inclined to Judaism. Reuchlin in 1511 published a defence under the title *Speculum Oculare*, in 1512 a German translation entitled *Augenspiegel*, and in 1513 his *Defensio contra Calumniatores*. In revenge the inquisitor Hoogstraaten formed a tribunal at Mentz, by the order of which the writings of

the German scholar were committed to the flames. An appeal was made to Pope Leo X., who referred the whole matter to the bishop of Spire, and that prelate declared Reuchlin innocent, and ordered the monks to pay the expenses of the investigation. Hoogstraaten appealed to the pope, who issued a mandate to suspend the proceedings against Reuchlin. The opening of the reformation prevented the matter from being revived; but the contest resulted really in favor of the advocates of classical literature, the study of Greek and Hebrew from that time becoming general among the Germans. (See EPISTOLÆ OBSCURORUM VIRO-
RUM.) In the war between Franz von Sickingen and Ulric, duke of Würtemberg, Reuchlin was obliged to leave Stuttgart, and in 1520 was made professor in the university of Ingolstadt by Duke William of Bavaria. He received an invitation to go to Wittenberg, and recommended in his place his cousin Philip Melancthon. Although suspected of a leaning toward Protestantism, he never renounced his connection with the Roman Catholic church. When in 1522 the plague broke out in Ingolstadt, he retired to Tübingen with the intention of devoting himself wholly to his studies, but soon sickened and died. Among his philological works are *Micropædia, sive Grammatica Græca* (Orleans, 1478); *Breviloquus, sive Dictionarium singulas Voces Latinas breviter Explicans*, which has been called the first Latin dictionary (Basel, 1478); *Rudimenta Hebraica* (Pforzheim, 1506); and *De Accentibus et Orthographia Hebræorum Libri III.* (Hagenau, 1518). His edition of the seven penitential psalms (Tübingen, 1512) is thought to have been the first Hebrew work printed in Germany. For the system of Greek pronunciation which he established, and which is known as iotacism or Reuchlinism, see GREECE (LANGUAGE AND LITERATURE), vol. viii., p. 209.—See *Johann Reuchlin, sein Leben und seine Werke*, by Ludw. Geiger (Leipsic, 1871).

RÉUNION, île de la, an island in the Indian ocean, belonging to France, between lat. 20° 50' and 21° 24' S., and lon. 52° 56' and 53° 34' E., 120 W. S. W. of Mauritius and about 410 m. E. of Madagascar; area, about 970 sq. m.; pop. in 1868, 212,536, about one sixth whites, and the rest chiefly negroes and coolies. The island is formed of two volcanic mountain ranges. The high central plateaus are known as *la plaine des Psalmistes* and *la plaine des Cafres*. The highest and northernmost peak, the Piton des Neiges, is more than 10,000 ft. high. In the south is the Piton de Fournaise, an active volcano, about 7,000 ft. high; the Gros Morne volcano is extinct. The climate is salubrious despite the great summer heats, violent hurricanes, and fevers. A girdle road finished in 1854 extends over 100 m. in the interior of the island. There are no navigable rivers, but many torrents and several lakes. The staple product is sugar, besides which the chief exports are mo-

lasses, coffee, cacao, and cloves. Horses, cattle, grain, rice, wines, beer, oils, salt fish, and other articles are imported. The chief commerce is with France. Since August, 1873, all foreign goods except tobacco are liable to only the same duties as those from France. The arrivals in 1873 comprised 185 French and 21 foreign vessels, and the total trade with France is estimated at about 36,000,000 francs.—The island was discovered in 1505 by the Portuguese Mascarenhas, whose name it bore till 1642, when the French took it and called it Bourbon. The English occupied it from 1810 to 1815, when it was restored to France. It was called Réunion during the revolution and the first empire, and Bourbon from the restoration till 1848, since which it has again been called Réunion. Slavery was abolished in 1848. The island is administered by a governor and a council of 30 members, the latter elected by the resident French. It is divided into the arrondissements du Vent and sous le Vent. The chief towns are St. Denis, the capital, St. Paul, and St. Benoît.

REUS, a city of Catalonia, Spain, in the province and 11 m. W. of the city of Tarragona; pop. about 25,000. It is situated on a gently sloping plain near the base of a low mountain range, and was formerly fortified. It consists of an old and a new town, the former dating from 1151, and the latter from the last century. There are 11 public squares and several subterranean aqueducts. The parish church of San Pedro is a stately Gothic pile with an imposing tower. Outside the town are two sanctuaries, one of which contains a gorgeous image of the Virgin, which is visited by large numbers of worshippers. The city has over 100 cotton and silk factories, and numerous oil mills, distilleries, and soap and earthenware factories. The commercial prosperity of Reus dates from the establishment there of English manufacturers in 1750.

REUSS, a river of Switzerland, tributary to the Aar, rising in the canton of Uri, near Mt. St. Gothard, within the small district where the Rhine, Rhône, and Ticino also have their source. It flows, fed by glaciers, in a northerly direction into the lake of Lucerne, and after leaving it follows a winding course, at first N. N. W. to the junction of the Emme, then N. E., and then crosses in a N. N. W. direction the canton of Aargau, joining the Aar at Windisch, east of Brugg. The total length of the river is about 100 m. Above Lake Lucerne it falls 4,500 ft., with many magnificent cascades; below it is navigable. The new road (built 1820-'32) over the St. Gothard crosses the Reuss eight times, one of the bridges being the celebrated Devil's bridge. (See DEVIL'S BRIDGE.)

REUSS, a territory of central Germany, between lat. 50° and 51° N., and lon. 11° and 13° E., enclosed by Saxe-Meiningen, Prussian Saxony, Saxe-Weimar, Altenburg, the kingdom of Saxony, and Bavaria; area, 443 sq. m.; pop.

in 1871, 134,126, nearly all Protestants. It consists of two unequal portions, separated by the southern part of Weimar. It is a part of what was formerly known as Voigtland, mostly hilly, and traversed by the upper courses of the White Elster and Saale. Cattle and sheep are reared, and linen, woollen, and cotton are manufactured. The territory forms now two sovereign principalities of the German empire, Reuss-Greiz and Reuss-Schleiz. The former division (area, 123 sq. m.) is the patrimony of the elder branch of the reigning family; its capital is Greiz, on the Elster. The latter (area, 320 sq. m.), which is ruled by the younger line, comprises the principalities of Schleiz, Lobenstein-Ebersdorf, and Gera, the capital being Schleiz. The house of Reuss had its origin in the 12th century. All the male members of the princely family have from the beginning been named Henry, at first distinguished by surnames and afterward by numbers, the elder line beginning a new series after reaching C. (100), and the younger with each century. The present reigning princes (1875) are Henry XXII. of the elder line, son of Henry XX., and Henry XIV. of the younger line, son of Henry LXVII.

REUTER, Fritz, a German novelist, born at Stavenhagen, Mecklenburg-Schwerin, Nov. 7, 1810, died in Eisenach, July 12, 1874. He studied at Jena, where he joined the *Burschenschaften*, and was in 1834 sentenced to death, but relieved after being imprisoned seven years. He afterward lived at Treptow and Eisenach, and acquired celebrity as a writer of works in Platt-Deutsch (complete ed., 13 vols., Wismar, 1863-'8). His posthumous works were published in 1875 (2 vols.).—See *Fritz Reuter und seine Gedichte*, by O. Glagau (Berlin, 1875).

REUTER, Paul Julius. See supplement.

REUTLINGEN, a town of Württemberg, capital of the Black Forest circle, on the Echatz, 20 m. S. of Stuttgart; pop. in 1871, 14,237. It has a pomological school, several other special schools, and a well endowed hospital. St. Mary's church, with a tower about 350 ft. high, which was erected in the 14th century and restored in 1844, is considered the most beautiful church of Württemberg. In 1863 a monument was erected here to Friedrich List, who was a native of the town. There are important manufactures of cloth, hats, powder, soap, &c. Reutlingen was in 1240 made a free imperial city, and in 1803 united with Württemberg. It has always been strongly Protestant, having subscribed the Augsburg confession in 1530.

REVEL, or **Reval**, a town of Russia, capital of the government of Esthonia, situated on the bay of Revel on the S. side of the gulf of Finland, 200 m. W. S. W. of St. Petersburg; pop. in 1867, 27,325. The town consists of two parts, the older and larger of which stands upon a rocky eminence, and the other is built along the beach. Buildings deserving notice are the provincial assembly house of the nobles, and

the imperial palace of Katharinenthal, founded by Peter the Great, with a beautiful park now open to the public. The town contains a gymnasium, a school of midwifery, several benevolent institutions and associations, Lutheran, Roman Catholic, and Greek churches, and public libraries. It is much resorted to as a watering place. A brisk export trade is carried on in corn, spirits, hemp, flax, timber, and other Baltic goods. Revel was founded by Walde-mar II. of Denmark about 1218, and was one of the most prosperous towns of the Hanseatic league. It subsequently fell under the sway of the knights sword-bearers of Livonia and under that of Sweden. Peter the Great obtained possession of it in 1710.

REVELATION, Book of the. See APOCALYPSE.

REVERE, Paul, an American patriot, born in Boston, Jan. 1, 1735, died there, May 10, 1818. He was of Huguenot descent, and was brought up to his father's trade of goldsmith. In 1756 he was a lieutenant of artillery in the colonial army, and was stationed at Fort Edward near Lake George. On his return he established himself as a goldsmith, and by his own unaided efforts learned the art of copperplate engraving, and at the breaking out of the revolutionary war was one of the four engravers then living in America. In 1766 he engraved a print emblematic of the repeal of the stamp act, which was very popular, as was likewise another called "The Seventeen Rescindors." In 1770 he published a print of "The Boston Massacre," and was one of the grand jury which refused to serve because of the action of parliament in making the judge independent of the people. In 1775 he engraved the plates, made the press, and printed the bills of the paper money ordered by the provincial congress of Massachusetts. By that body he was sent to Philadelphia to learn the art of making powder, and on his return set up a mill. He was one of those engaged in the destruction of the tea in Boston harbor (1773), and was sent to New York and Philadelphia to carry to those places the news of what had been done. When the decree for closing the port of Boston reached that city, he was again sent to those places to invoke their sympathy and coöperation. When Gen. Gage prepared an expedition to destroy the military stores of the colony at Concord, Warren, at 10 o'clock on the night of April 18, 1775, despatched William Dawes through Roxbury to Lexington, and Revere by way of Charlestown, to give notice of the event. Five minutes before Gen. Gage's order was received to prevent any American from leaving Boston, he was rowed across Charles river, and escaping the British officers rode in the still night to Lexington, rousing every house on his way. A little after midnight both messengers reached Lexington, roused Hancock and Adams, and then pushed on to Concord, but were afterward taken prisoners, brought to Lexington, and there released. Revere became a lieutenant colonel in the defence of the

state of Massachusetts, and after the war cast church bells and cannon. He built the copper-rolling works at Canton, Mass., now conducted by the Revere copper company.

REVOLVER. See **PISTOL**.

REYBAUD, Marie Roch Louis, a French author, born in Marseilles, Aug. 15, 1799. He was brought up as a merchant, made several commercial voyages, and in 1828 settled in Paris. He wrote for various liberal journals, and conducted the *Histoire scientifique et militaire de l'expédition française en Egypte* (10 vols. 8vo, with an atlas of 2 vols., 1830-'36), editing more particularly the six volumes relating to the expedition under Bonaparte, Kléber, and Menou. From 1837 to 1840 he published in the *Revue des Deux Mondes* a review of Utopian theories, under the title of *Études sur les réformateurs et socialistes modernes* (2 vols., 1840-'43; 7th ed., 1864), for which he received from the French academy the grand Montyon prize. His most popular work, *Jérôme Paturot à la recherche d'une position sociale* (3 vols. 8vo, 1843), was followed by *Jérôme Paturot à la recherche de la meilleure des républiques* (4 vols. 18mo, 1848). He has also written *La Syrie, l'Égypte et la Palestine* (4to, with plates, 1834 et seq.), in conjunction with Baron Taylor; *La Polynésie* (8vo, 1843); and *L'Industrie en Europe* (1856). M. Reybaud was elected to the legislature as a democrat in 1846, as a republican in 1848, and as a conservative in 1849; and he was a member of the consultative commission after the *coup d'état* of 1851.

REYER, Louis Étienne Ernest, a French composer, whose real name is Rey, born in Marseilles, Dec. 1, 1823. He was employed in the civil service at Algiers till 1848. His *Le Sélam*, for which Gautier wrote the words, was successfully performed in 1850, and in 1854 appeared his comic opera *Maitre Wolfgram*. His subsequent works comprise *Sacountala*, a ballet, and the opera of *La statue*. His *Érostrate* was less successful. His latest work is *Souvenirs d'Allemagne* (1875).

REYKIAVIK (Icel. *Reikjavig*), a seaport town and the capital of Iceland, at the head of a bay opening into Faxaflord, on the S. W. coast; lat. 64° 8' 24" N., lon. 21° 55' 15" W.; pop. about 1,400. It is the residence of the governor and the seat of the *althing* or legislature and of the supreme court. It has a cathedral church, a college with six professors, a school of theology and other schools, an observatory, a public library of 10,000 volumes, and two political newspapers. An important annual fair is held here. During summer regular steam communication is maintained with Leith and Copenhagen.—Reykjavik, founded in 874, was the first permanent settlement in Iceland. Its 1,000th anniversary was celebrated on Aug. 7, 1874; and on the same day the municipality of Copenhagen voted 6,000 rixdalers for the erection of a monument there in honor of Thorwaldsen, whose father was a native of Iceland.

REYNOLDS, a S. E. county of Missouri, drained by the head waters of the Big Black river; area, about 700 sq. m.; pop. in 1870, 3,756, of whom 11 were colored. It has an undulating surface and fertile soil. The chief productions in 1870 were 13,382 bushels of wheat, 168,255 of Indian corn, 17,680 of oats, 13,385 lbs. of tobacco, 6,607 of wool, and 48,000 of butter. There were 1,075 horses, 3,585 cattle, 4,810 sheep, and 9,953 swine. Capital, Centreville.

REYNOLDS, Sir Joshua, an English painter, born at Plympton, Devonshire, July 16, 1723, died in London, Feb. 23, 1792. He was educated in the free grammar school of Plympton, of which his father, the Rev. Samuel Reynolds, was master. In his 18th year he was placed with Hudson, the principal portrait painter of the time, and while with him made many careful copies of drawings by Guercino, which probably disqualified him in after life for drawing correctly from the living model. About the age of 20 he settled as a portrait painter in Plymouth, and through the assistance of Lord Mount Edgecombe, Captain (afterward Lord) Keppel, and other naval officers, commenced his career with considerable success. After the death of his father in 1746 he removed to London. In 1749 he accompanied Keppel in his ship, the *Centurion*, to the Mediterranean, and for three years and a half studied his profession in various cities of Italy. In the Vatican he caught a severe cold which resulted in permanent deafness. He was unable at first to appreciate the paintings of Raphael, and they never had much influence upon his style, which naturally imitated that of the great Venetian masters more than any others. He returned in the latter part of 1752 to London, and by a full-length portrait of Commodore Keppel, executed not long after his arrival, placed himself at the head of his profession in England, and in public estimation almost on a level with Vandyke. Thenceforth until the close of his life he enjoyed unvarying prosperity. He was soon obliged to employ several assistants to paint the draperies and other accessories of his pictures. His paintings were very numerous, 244 being sent to the academy for exhibition. Dr. Johnson mentions in 1762 that his professional income was 6,000 guineas a year, and it must subsequently have reached a much higher sum, as his price for heads was increased gradually from 10 guineas in 1752 to 50 in 1779, the other sizes being in proportion. Of his portraits, which, as Macaulay has observed, "have preserved to us the thoughtful foreheads of so many writers and statesmen, and the sweet smiles of so many noble matrons," the number is very considerable, and the technical merits, especially with respect to color and chiaroscuro, are of the first order. His portraits of women and children are among the most admired productions of modern art. Among the portraits of distinguished persons painted by him may be mentioned those of

Gen. Elliot (Lord Heathfield), Lord Ligonier on horseback, Sterne, Goldsmith, Dr. Johnson, Burke, Boswell, Wyndham, Earl Camden, Fox, Erskine, George III. and his queen, Horace Walpole, Beattie, John Hunter, Garrick between Tragedy and Comedy (for which in 1762 he received 300 guineas), Mrs. Siddons as the tragic muse (a picture which he valued at 1,000 guineas), the celebrated Georgiana, duchess of Devonshire, the earl and countess of Bute, and himself. His productions in history are generally admitted to be much inferior to his portraits, though many of them have been greatly admired. Among the most remarkable are his "Count Ugolino and his Sons," painted in 1773, and purchased by the duke of Dorset for 400 guineas; the designs of the cardinal and Christian virtues and the Nativity for the window of New college chapel, Oxford; the "Infant Hercules strangling the Serpents" (1784), now in St. Petersburg, for which the empress Catharine paid his executors 1,500 guineas; the "Cauldron Scene from Macbeth," "Puck," and the "Death of Cardinal Beaufort," for which he received respectively 1,000, 100, and 500 guineas; the "Holy Family," in the British national gallery; and "Cymon and Iphigenia," and the "Death of Dido," both in the queen's private collection. His "Strawberry Girl," formerly in the collection of Samuel Rogers, "Samuel Kneeling in Prayer," the portrait piece in the national gallery representing three ladies as the Graces decorating a terminal statue of Hymen, and the "Puck" above mentioned, illustrate very happily his taste and fancy in painting women and children. But many of these pictures are hastening to decay, owing to the introduction of wax and other incongruous mixtures, and the use of asphaltum glazes. Burnet says: "So anxious was he to combine the luminous qualities of the Venetian style with the rich transparency of Correggio and Rembrandt, that half his life was spent in trying experiments on the various modes of producing this union, and which has occasioned the decay and destruction of many of his works;" and Northcote tells us that he deliberately scraped away and destroyed Venetian paintings of value in order to discover their technical secrets. On the foundation of the royal academy in 1768, Reynolds was chosen its president and knighted. He retained this office until the close of his life, delivering within that period 15 annual discourses on art, which have been translated into various languages. A complete edition of his literary works forms vols. lxxviii. and lxx. of Bohn's "Standard Library," and contains his lectures, some contributions to the "Idler," remarks upon the works of Dutch and Flemish painters during a tour through the Netherlands in 1781, and other miscellaneous pieces, together with a life of the painter by Beechey. In private life Sir Joshua was remarkable for amiability and his varied and instructive conversation. Johnson, Gold-

smith, Burke, Garrick, and other distinguished literary men were his intimate associates, and he was one of the founders of the "Literary Club," of which they were prominent members. In the latter part of 1791 he was threatened with loss of sight in consequence of a tumor over his left eye, and at once resigned the practice of his art, the last effort of his pencil being a portrait of Fox. He died, after a painful illness, of a disease of the liver. He was never married, and his fortune, estimated at £80,000, was bequeathed to his niece, Miss Palmer, subsequently marchioness of Thomond.—There is a life of him by Northcote, valuable as a record of his conversation and aphorisms, and one by William Cotton. A biography left unfinished by C. R. Leslie was completed and published under the editorial supervision of Tom Taylor (2 vols., London, 1864-'5). See also "English Children as painted by Sir Joshua Reynolds," by F. G. Stephens (1866); "Sir Joshua Reynolds as a Portrait Painter," illustrated with autotype reproductions from engravings by Green, Watson, and others, by J. Churton Collins (fol., 1873); and "A Catalogue Raisonné of the Engraved Works of Sir Joshua Reynolds, from 1755 to 1820," by Edward Hamilton (1874).

RHABANUS. See **RABANUS**.

RHADAMANTHUS, in Greek mythology, one of the three infernal judges, the others being Minos and Æacus. Rhadamanthus judged the people of Asia and Africa, Æacus those of Europe, and the judgments of both were revised by Minos. Rhadamanthus was reputed the son of Jupiter, and sometimes of Vulcan, and was said to have been born at Cnossus in Crete, and to be the brother of Minos I., king of that island. At Thebes he married Alcmena, the widow of Amphitryon, and subsequently made a descent upon the Cyclades, which he conquered and over which he reigned.

RHÆTIA, a province of the Roman empire, which in the reign of Augustus was bounded N. by Vindelicia, E. by Noricum, S. by Gallia Cisalpina, and W. by the country of the Helvetii. Later Vindelicia was added to it, and the province extended as far N. as the Danube. At a still later period it was divided, the original province being called Rhætia Prima, and Vindelicia, Rhætia Secunda. Rhætia proper corresponded to the modern Grisons, Tyrol, and some of the northern parts of Lombardy. The valleys formed by the rivers Athesis (now Adige) and Enus (Inn) furnished fine lands for cultivation; but the inhabitants were engaged chiefly in the raising of flocks. They were a mountain race, fond of freedom, fighting, and plunder. They were subdued by the Romans under Drusus and Tiberius in 15 B. C., although they fought with desperate courage. Two roads were made through the province, the one leading from Augusta Vindelicorum (Augsburg) to Comum (Como), and the other from the same place to Verona. Their chief city was Tridentum (Trent), and the inhab-

itants were divided into tribes. Their descendants in Tyrol speak Romansh, which is a corruption of Latin intermixed with German, Celtic, and perhaps Etruscan elements. (See ETRURIA, and ROMANSH.) During the latter years of the empire the province became almost depopulated, but after the death of Theodoric it was settled by the Boioarii.

RHAMADAN. See RAMADAN.

RHAMNUS PURSHIANA. See supplement.

RHE. See Ré.

RHEA, in Greek mythology. See CYBELE.

RHEA, a S. E. county of Tennessee, bordered S. E. by the Tennessee river, drained by its branches, and intersected by a range of the Cumberland mountains; area, about 500 sq. m.; pop. in 1870, 5,538, of whom 531 were colored. The chief productions in 1870 were 32,639 bushels of wheat, 187,970 of Indian corn, 36,034 of oats, 1,332 tons of hay, 10,276 lbs. of tobacco, 9,088 of wool, and 9,041 gallons of sorghum molasses. There were 1,152 horses, 1,455 milch cows, 3,026 other cattle, 5,306 sheep, and 9,239 swine; and 3 wool-carding and cloth-dressing establishments. Capital, Washington.

RHEA SILVIA. See ROMULUS.

RHEGIUM. See REGGIO DI CALABRIA.

RHEIMS, or **Reims** (anc. *Durocortorum*, afterward *Remi*), a city of Champagne, France, in the department of Marne, on the Vesle, a tributary of the Aisne, near the Marne and Aisne canal, 82 m. E. N. E. of Paris; pop. in 1872, 71,994 (in 1851, 45,754). The cathedral, built in the early part of the 13th century, and completed in the 15th, is one of the finest Gothic edifices in Europe; in it the French kings were crowned for many centuries, the last coronation being that of Charles X., when the oil in the fragment of the holy ampulla was exhausted. (See AMPULLA.) Among the many other noteworthy buildings are the archbishop's palace and the hôtel de ville. There are several schools of high grade, a museum, and a library. A university existed here from 1547 to 1793. Rheims is a centre of the trade in Champagne wine, and of woollen, cotton, and other manufactures. The annual transactions in woollen goods are estimated at 75,000,000 francs.—Under the Romans Rheims was the capital of Belgica Secunda. Its bishops, dating from the 4th century, and its archbishops, from the 8th, were down to the revolution among the primates of France. After many sieges during the middle ages, it withstood one by the English under Edward III. (1359), but was occupied by them from 1421 to 1429, when they were expelled by Joan of Arc. The Germans occupied the city on Sept. 4, 1870.—See *Rheims, la ville des sacres*, by Baron Taylor (1854; new ed., 1860).

RHENISH CONFEDERATION (Ger. *Rheinbund*), a confederacy formed in 1806 by the kings of Bavaria and Würtemberg, the elector arch-chancellor of the empire, the elector of Baden, the duke of Berg, the landgrave of Hesse-

Darmstadt, the princes of Nassau-Usingen, Nassau-Weilburg, Hohenzollern-Hechingen, Hohenzollern-Sigmaringen, Salm-Salm, and Salm-Kyrburg, the duke of Arenberg, the princes of Isenburg-Birstein and of Liechtenstein, and the count von der Leyen. They communicated to the federal diet their withdrawal from the empire, Aug. 1, 1806, assigning as the reason for the separation the defects of the imperial constitution. At the same time Napoleon, the instigator of this movement, officially declared to the diet that he would no longer acknowledge a German empire. Francis II. consequently, on Aug. 6, abdicated as emperor of Germany, and took the title of emperor of Austria. Napoleon constituted himself "protector of the Rhenish confederation," the members of which bound themselves to take up arms against the enemies of France. The confederacy was subsequently joined by the elector of Würzburg, the king (formerly elector) of Saxony, the five Saxon dukes, the two princes of Schwarzburg, the three dukes of Anhalt, the new king of Westphalia, and many minor princes; so that by the end of 1808 the confederacy extended over 125,000 sq. m., with a population of nearly 15,000,000. The reverses of Napoleon in 1813 put an end to its existence, and its members were soon after merged in the Germanic confederation.

RHENISH PRUSSIA. See RHINE, PROVINCE OF THE.

RHENISH WINES. See GERMANY, WINES OF.

RHEUMATISM (Gr. *ῥεῦμα*, a flow, discharge). Acute rheumatism is an inflammation of the joints, characterized by general fever, by pain, heat, redness, and swelling of the joints affected, and by a tendency to leave one joint suddenly and fasten upon another. The affection sometimes commences by chills and fever, and general uneasiness; and these symptoms (rheumatic fever) may last for 24 hours or more before the local manifestations show themselves. More frequently the local symptoms make their appearance at the same time with the fever, and occasionally they are present some little time before it supervenes. The pain in the joint or joints affected, commonly but little felt while the patient is perfectly quiet, becomes intense on the slightest motion, so that he is rendered completely helpless. The superficial joints become swollen and tense, they are hotter than natural, and the skin covering them is generally more or less reddened. The swelling is sometimes mainly caused by effusion within the capsular ligament of the joint itself, at others by the inflammation and thickening of the fibrous tissues external to the joint. The pulse is generally full, strong, and moderately frequent, rarely rising over 100 beats in a minute; the skin is warm, and copious sour perspirations are commonly present; sweating was present in rather more than four fifths of the cases noted by M. Louis. The tongue is thickly coated, the bowels somewhat constipated, and the appetite completely

lost. The inflammation at first affects one or two joints, rarely three; after a variable time it commonly leaves the joints first affected as suddenly as it attacked them, and fastens on some other articulation; often however new joints are attacked without the disease leaving its original seat. As a rule, the larger joints are the ones most liable to be attacked, the knees, elbows, ankles, wrists, and hips; more rarely the smaller joints of the toes and fingers become affected. Besides the articulations, acute rheumatism frequently attacks the heart, not by metastasis, or transference of the inflammation from one part to the other, but by seizing on the fibrous textures of the heart as on one of the series of textures liable to the disease. Sometimes the pericardium is attacked (pericarditis), sometimes the lining membrane of the heart's cavities (endocarditis). (See HEART, DISEASES OF THE.) The younger the patient, the more liable is the heart to be affected; so that when rheumatism occurs previous to adult age, the heart is attacked in a large majority of cases. The rheumatic constitution is frequently hereditary, and rheumatism is peculiarly a complaint of cold, damp seasons and climates; but beyond this we know but little of the causes which induce it. The disease sometimes disappears in 10 or 12 days, sometimes lasts for months, while in other cases again it may lapse into a subacute or chronic state and continue indefinitely. Rheumatism, when uncomplicated, is rarely attended with immediate danger to life; but by damaging the heart it often lays the foundation for incurable disease. Occasionally fatal cases are met with.—Acute rheumatism has been treated in a great variety of ways. Bleeding, mercurials, mercurials with purgatives, opium, sulphate of quinine, and nitrate of potassa in large doses have been at various times resorted to. Of these methods, those by large doses of sulphate of quinine and by nitrate of potassa have seemed to have an influence in controlling and cutting short the disease, and the treatment by quinine appears to be successful in the acutest and most violent attacks; but they are both subject to inconvenience and dangers which counterbalance their advantages. The treatment which is most generally relied on is the alkaline. Tartrate of potash and soda (Rochelle salt) or acetate of potash is given in full doses short of producing purgation, until the urine is rendered alkaline. Occasionally a purgative may be required, or an opiate may be given at night to produce sleep. The treatment by lemon juice, advocated by Dr. Garrod, is in truth an alkaline treatment, the acid citrate of potash contained in the lemon juice being eliminated by the kidneys as a carbonate.—Chronic rheumatism presents itself under two forms. In one the joints are swollen and painful, the pain being aggravated by motion; there is no general fever, and the appetite may be good and the digestion sound. The affection is exceed-

ingly obstinate, attacking new joints without leaving those first affected; it frequently attacks the smaller joints, rendering them permanently swollen and deformed, while the immobility to which the joints are sometimes reduced may cause atrophy of the muscles connected with them. The treatment is unsatisfactory; sometimes alkalies or diuretics are of service, sometimes iodide of potassium seems of use; while the native sulphur waters, such as those of Sharon, St. Catharine's, the Virginia sulphur springs, &c., used both externally and internally, are frequently of great service. In the second variety of chronic rheumatism, sometimes termed passive rheumatism, the joints are neither red nor swollen, but simply stiff and painful, the pain being increased by motion, but not preventing labor or exercise. It is aggravated by cold and damp and relieved by heat. Warm salt water baths, and the use of flannel and stimulating liniments, afford some relief. Where it is possible, removal to a warm climate is advisable.

RHIN, Bas. See ALSACE-LORRAINE.

RHIN, Haut. See HAUT-RHIN.

RHINE (Ger. *Rhein*; Dutch, *Rijn* or *Ryn*; Fr. *Rhin*; anc. *Rhenus*), one of the principal rivers of Europe, having its sources in the Swiss canton of Grisons, and flowing into the North sea by an extensive delta of five mouths in Holland, after a circuitous but general N. N. W. course of about 800 m. The Rhine is usually divided into three parts, the upper, middle, and lower, the first lying within and along part of the boundary line of Switzerland, the second between Basel and Cologne, and the third between Cologne and the sea. The river originates in the Lepontine Alps in three branches, the Vorder, Mittel, and Hinter Rhein, the first and most western of which is considered the principal source. It rises in lat. 46° 38' N., lon. 8° 48' E., in the small lake of Toma, on the E. side of a mountain of the St. Gothard group, 7,687 ft. above the sea, runs as a torrent for about 12 m., during which it descends nearly 4,000 ft., and is joined at Dissentis by the Mittel Rhein from the right. It then flows in a general E. by N. direction for about 36 m. to Reichenau, where it receives the Hinter Rhein, also from the right, and becomes about 180 ft. wide, and navigable for river boats. Having continued the same course to Coire, it thence flows through a valley about 50 m. long and from 1 to 2 m. wide in a northerly direction to the lake of Constance, and for part of the distance forms the boundary line separating the principality of Liechtenstein and the Austrian district of Vorarlberg from Switzerland. After issuing from the lake at Constance it flows for a few miles in a westerly direction, till it enters the Untersee, which is about 30 ft. lower than the lake of Constance. It continues its course in the same direction to the falls of Schaffhausen, a little way below the town of that name, where the surface of the

river is 1,280 ft. above the sea, and the falls vary from 60 to 75 ft. in height. Below these falls the general course is still westerly, but very tortuous; and the river flows between mountains for about 50 m. to Laufenburg, where the navigation is again interrupted by a cataract. The bed is here narrowed to about 50 ft., and boats ascend and descend by means of ropes after being unloaded. About 10 m. below Laufenburg there is a rapid of considerable length, which is exceedingly dangerous, though it does not stop navigation. This is the last impediment to the navigation of the upper Rhine. Below this rapid the level of the river is 850 ft. above the sea, and it is only 50 ft. less at Basel. Above this point the Rhine receives numerous tributaries, the most important being the Aar, which, emptying about 12 m. above Laufenburg, brings the drainage of the greater part of Switzerland. From the lake of Constance to Basel the Rhine forms the boundary line between Baden and Switzerland.—Where the middle Rhine begins at Basel, the river has left the mountainous region, and changed its course to a northerly direction. It flows for about 200 m., to Mentz, through a valley from 30 to 50 m. wide, extending between the Black Forest and other mountains on the east, and the Vosges and the Hardt mountains on the west, forming the boundary line between Baden and Alsace, and Baden and Rhenish Bavaria, and passing through Hesse-Darmstadt. Between Basel and Strasburg, about 80 m., the fall of the river is $4\frac{1}{2}$ ft. per mile, and the current very rapid. The bed is wide and obstructed by numerous movable sand banks and small islands, which render the navigation intricate and dangerous. For the next 60 m., to Germersheim, the islands increase in size and are less liable to shift their position. Gold is washed from the sand and gravel along this part of its course, but not in paying quantities. Below Germersheim islands are rare, and the river flows sluggishly in large bends to Mentz, where its surface is only about 250 ft. above the sea. Many of the isthmuses formed by these bends have been cut through of late years, so as to shorten its course. Between Strasburg and Mentz it is navigable for boats of about 100 tons burden, which descend with the current, but in going up are tracked chiefly by horses. Between Mentz and Cologne, about 120 m., the course of the river is first W., then N. N. W., and afterward mostly N. W. It first forms the boundary between Hesse-Darmstadt and the Prussian province of Hesse-Nassau, and then between the latter and the Prussian Rhine province, which it enters near Coblenz. This part of the river runs between two mountain regions, where in many places the hills come so close to the banks of the river that there is scarcely room for a road. The produce of the extensive vineyards in this neighborhood is known as Rhenish wines. There is a ledge of rocks at Bingen which pre-

vents steamers and barges from passing during foggy weather or at night. The surface of the water at Cologne is 120 ft. above the sea. During its middle course the Rhine receives many tributaries; but, with the exception of the Moselle, those from the west are all short and not navigable. On the right or E. side the tributaries are much larger and more numerous, the most important being the Neckar, Main, Lahn, and Sieg.—The lower Rhine extends for about 300 m. from Cologne to its mouths, and flows through a low level country, with the hills of Sauerland near its E. bank between Cologne and Düsseldorf. From Cologne to Wesel its course is mostly N. N. W., though very tortuous. From Wesel to the frontiers of Holland it flows N. W. Below Cologne the Rhine is navigable for sea-going vessels, and the fall from thence to its mouth is only about 4 in. in a mile, and the current extremely sluggish. Shortly after entering Holland, near the village of Pansterdam, the Rhine divides into two arms, the southern of which takes the name of Waal, the northern preserving that of Rhine. The Waal, which joins the Maas, is here 210 yards broad, while the Rhine is only 114 yards, and about two thirds of the volume of water runs into the former. After the separation the Rhine flows N. N. W., and near Arnhem, 12 m. lower down, it again divides into the Yssel, which runs N. to the Zuyder Zee, and the Rhine, which flows W. At Wyck, about 30 m. lower down, the Rhine divides for the third time, into the Leck and Kromme Ryn (Crooked Rhine), the former of which is the larger. The Kromme Ryn runs N. W. to Utrecht, where the last division takes place, into the Vecht, which flows to the Zuyder Zee, and the Oude Ryn (Old Rhine), which continues westward past Leyden. The mouth of the Oude Ryn was formerly obstructed by dunes or sand hills, and the river did not reach the sea; but in 1807 a canal was cut through them, and it now communicates with the North sea at Katwyk, a few miles N. W. of Leyden. Before it begins to form the delta the lower Rhine is augmented by the Erft, Ruhr, and Lippe, all of which are navigable. The Yssel was originally a canal cut by Drusus to unite the Rhine with the river now called Oude Yssel (Old Yssel). The Leck, or middle branch of the Rhine, was also originally a canal made by the Roman general Corbulo; but in A. D. 839 its bed was so much enlarged by a flood that it became the main stream. The delta of the Rhine is bounded N. by the Zuyder Zee, E. by the Yssel, S. by the Waal and Maas, and W. by the North sea; it comprehends the three Dutch provinces of North and South Holland and Utrecht, and about two thirds of Gelderland, all of which country would be subject to inundations were it not protected by embankments. These embankments begin in the Prussian district of Düsseldorf, extend along the banks of the different arms of the Rhine

to the sea, and are generally from 25 to 30 ft. above the lowest level of the river.—The basin of the Rhine is estimated at 80,000 sq. m., of which 13,000 belong to the upper, 40,000 to the middle, and 27,000 to the lower Rhine. The river is generally covered with ice for from six weeks to two months in winter; and when snow accumulates and a thaw suddenly sets in, the lowlands are liable to inundations that are sometimes attended with great loss of life and property. The different arms of the Rhine are united by numerous canals, and the river itself is connected by canals with the Saône and Rhône, the Scheldt, Maas, and Danube; and an extensive trade is carried on upon all these as well as the chief navigable tributaries, the Moselle, Main, Ruhr, and Neckar. The annual traffic is of great importance, and is regulated by treaties between the different states through which it runs, all of which lay toll duties on vessels and goods passing their boundaries.—The Rhine is celebrated for the picturesque beauty of the scenery in the upper and middle part of its course, and is annually visited by a multitude of tourists. More than 1,000,000 passengers are conveyed up and down annually. Steam vessels ply between the principal towns on its banks. It is crossed at several points by pontoon bridges, and many of the principal places on either side are connected by railways. There is great discrepancy among ancient writers with regard to the number of mouths by which the waters of the Rhine formerly flowed into the sea. Some speak only of two; others say there were three; and Cæsar says there were several branches.

RHINE, Province of the, or Rhenish Prussia (Ger. *Rheinprovinz*, *Rheinpreussen*, or *Rheinland*), a W. province of the kingdom of Prussia, lying on both sides of the Rhine, bordering on the provinces of Westphalia and Hesse-Nassau, the grand duchy of Hesse, Bavaria, Alsace-Lorraine, Luxemburg, Belgium, and Holland; area, 10,416 sq. m.; pop. in 1871, 3,579,347, of whom about 74 per cent. were Roman Catholics, 25 per cent. Protestants, and the remainder Jews. The N. part of the province is level, the E. and S. parts mountainous. The principal mountain ranges are the Hohe Venne, the Eifel (about 2,500 ft. high), and the Hunsrück, W. of the Rhine, and the Siebengebirge, E. of it. The chief river next to the Rhine is its western affluent the Moselle. The province is rich in minerals, and is fertile and well cultivated. The manufactures are extensive, and comprise almost every species of industry. It is divided into the administrative districts of Cologne, Düsseldorf, Coblenz, Treves, and Aix-la-Chapelle, and contains besides the cities of those names Bonn, Crefeld, Elberfeld, Jülich, Wesel, Berg, and Cleves. Capital, Coblenz.

RHINOCEROS (Gr. *ῥίς*, nose, and *κέρας*, horn), an ungulate mammal, surpassed in size among present terrestrial animals only by the elephant, and perhaps by the hippopotamus. The head

is long and triangular, and from the upper surface of the end of the nose springs a single or double horn, composed of a solid mass of agglutinated hairs or horny fibres; this is supported on the nasal bones, though not connected with them, belonging entirely to the skin and removed with it; it is often more than 3 ft. long, and gently curved backward, and so sharp as to make it a very formidable weapon; when there are two horns, the hinder is generally much the shorter. There are no canine teeth, and the incisors sometimes fall out when the animal is full-grown; the molars are $\frac{7}{2}$, with lunate ridges; the nose is blunt and rounded, and the upper lip elongated and very movable; the eyes are small, and the ears moderate, tipped with rigid hairs; the body is very bulky, the legs short and strong, and the feet three-toed with as many broad hoofs; the tail is short, round at the base, compressed laterally toward the end, and hairy at the tip; on the hind feet are sebaceous glands opening on the posterior surface, in a sacculated inversion of the skin, as on the anterior surface of the feet of sheep; the mammae are two, and inguinal. The skin is naked, very rough and hard, divided into large folds which give to the animal a shielded appearance; it is impervious to the claws of the lion and tiger, will turn the edge of a sword, and is impenetrable to ordinary musket bullets. The stomach is large and simple, the intestinal canal eight times as long as the body, the villi of the small intestine greatly developed, the large intestine very wide, and the cæcum sacculated. The ribs are 19 pairs, the iliac bones very wide, and the femur with a prominent ridge on the outer border terminating in a hook-like process and with the great trochanter exceedingly prolonged; the incisor teeth seem to be developed in an inverse ratio to the horns; the brain is large, but the relative size of the cerebrum, especially the upper and anterior portion, is less than in the elephant. The rhinoceros is found in the warm regions of Asia and Africa, living with the elephant in forests, and feeding on herbage and leafy twigs and shrubs. It is peaceable unless irritated; it then charges upon its enemy with the head down and the horn forward; though not very active, its great weight and strength make it a formidable assailant, and a match even for the elephant. The senses of smell and hearing are so acute that the hunter must approach against the wind and in perfect silence; it is hunted for sport by Europeans, and the natives eat the flesh, and sell the skin to traders for the manufacture of canes, whips, and defensive armor, and the horns for boxes and cups. In its native forests the rhinoceros has a tortoise-like appearance, with its stolid expression, slow movements, thick armor, short legs and tail, and curved upper lip.—Several species have been described, of which the best known is the single-horned or Indian rhinoceros (*R. unicornis*, Linn.; *R. Indicus*, Cuv.). This animal measures about 12 ft. in length,

with a circumference of the same, and a height of 6 ft.; the skin is very thick, arranged in broad folds in many parts, rough and tuberculated, and deep purplish gray. It was well known to the ancients, and is generally believed to be the unicorn or *reem* of the sacred writings, though not of the Arabian poets, which was either a wild bull or an antelope. It leads a quiet indolent life, wallowing on the marshy borders of rivers and lakes, and bathing in their waters; it moves slowly, the head carried low as in the hog; its strength enables it to pass with ease through the thickest jungles; it is found in the warmer parts of continental India. In captivity, especially if taken young, it is gentle, obedient, and grateful for kind treatment, with occasional paroxysms of rage without apparent cause; it is fond of bread, fruit, and particularly sweets, collecting and holding its food by the long upper lip; it is not uncommon in menageries, and has been trained to perform simple tricks, but its intelligence is far inferior to that of the elephant; though these two animals are said to have a natural antipathy to each other, they agree very well together in confinement. The Java rhinoceros (*R. Sondaicus*, Horsf.), with a single horn, is confined to Java; the epidermis is arranged in pentagonal shields. The Sumatran rhinoceros (*R. Sumatrensis*, Cuv.) is a smaller species with two horns and a comparatively smooth skin. For an account of its breeding see Maunder's "Treasury of Natural History" (London, 1874).—The black African rhinoceros (*R. bicornis*, Linn.; *R. Africanus*, Camper), the *borélé* of the S. African aborigines, has two horns, and a smoother skin, wrinkled instead of folded;



Black African Rhinoceros (*Rhinoceros bicornis*).

the incisors are either latent or fall away early; the horns, which as in the other species occur in both sexes, are brightly polished by rubbing against the trees, and the posterior is only one third the length of the anterior, the latter being rarely more than 18 in. The general color

in the male is black, in the female pale yellowish brown with purplish tints on the head, and the groins flesh-colored; the head seems too deep in proportion to its length, giving it a very clumsy appearance; the upper lip is scarcely at all prolonged; the neck short and thick, with a deep furrow where it joins the head, and a rudimentary hump on the shoulder. In size and habits it resembles the Indian species; it was formerly found even on the slopes of Table mountain, but has now been driven far beyond the limits of Cape Colony into the interior, where it is seldom molested. They keep concealed by day, wandering at night in search of water and food, especially the branches of the wait-a-bit thorns; the gait is equal to that of a good horse, and when disturbed the head is carried high; they are usually seen singly or in pairs. They are suspicious and savage, attacking the traveller, and so lean that the flesh is rarely eaten; wherever the footprints are seen, the ground and bushes are found torn up; this they do, not from rage, but in a mere wanton display of strength; they also dig the ground with the fore feet, throwing it backward in the manner of a dog. Dr. A. Smith, in his "Zoology of South Africa," makes three species; Dr. Livingstone considers that all the species made by naturalists beyond two are based on mere differences in size, age, and direction of horns, which vary much within the limit of a single species. The *R. keitloa* (A. Smith) is a rather smaller species, with two horns nearly equal in length, with more slender head and longer neck than in the *borélé*; the general color is pale brownish yellow, with a black mark on the inside of the thighs; the upper lip is elongated; it is swift, fierce, and dangerous, comparatively rare, and not found further south than lat. 25°.—The white rhinoceros (*R. simus*, Burch.), the *mohooohoo* of the Bechuanas, is the largest of the genus; the color is pale brownish white, with purplish tints on the shoulders and posterior parts; the head is comparatively long and slender, the face concave, forehead convex, neck long with three well marked wrinkles on nape, the nose truncated, the upper lip perfectly square and ox-like, and the shoulders with a distinct hump; the horns are two, the first very long and pointed, the second just behind it, short and obtuse. This is a rare species, timid, unsuspecting, easily captured on account of its slow movements, and much prized by the natives for its fat flesh; the food is principally grass. The Bechuanas call the rhinoceros by the general name of *chukuroo*. The best friend of this animal is a bird of the genus *buphaga*, known as the rhinoceros bird, which warns it of the approach of danger. It makes a harsh cry in the ear of the sleeping rhinoceros, which awaking rushes off into the forest to escape the hunter; it perches on the animal's back, returning when frightened or swept off by the branches, and remains with it all night. Cumming says he has often shot the rhinoceros

at midnight at fountains, and that these birds, imagining "chukuroo" was asleep, would remain until morning, and on his approaching, before taking flight, would try to awaken him from his deep sleep.—The rhinoceros played an important part among the animals of the tertiary and diluvial epochs, numerous species of great size occupying cold countries of Europe, where they now could not exist. Since 1781 many fragments have been found in Germany, Italy, France, England, and Russia. A few species have been detected in the lower miocene of France, of which the *R. tapirinus* (Pomel), of the size of a tapir, belonged to Kaup's group of *acerotherium*, characterized by two large incisors in each jaw, four toes on the anterior feet, and probably a very small, if any, nasal horn. In the upper miocene of France and Germany occur many species which De Blainville has united into the single *R. incisivus*, without bony partition between the nostrils, with two large incisors in each jaw and three toes on each foot. In the pliocene of France and England are species without bony nasal partition and with moderate incisors, like the *R. megarhinus* (Cuv.). The best known fossil species is the *R. tichorhinus* (Cuv.), of the diluvial deposits of Siberia and the most of Europe, contemporary with the mammoth. The most remarkable specimen was found in 1731 in arctic Siberia by a hunter; the body was well preserved and half buried in the frozen sand, in lat. 64° N.; it was $11\frac{1}{2}$ ft. long, with a skin like leather covered with short hair; the nasal bones were curved in front of the nose to unite with the intermaxillaries, and the partition between the nostrils was bony to the extremity, giving greater solidity to the nose for the support of the two large horns, which were further separated than in the living species; the incisors fell out in the adults, and the symphysis of the lower jaw was very long; coming nearest to the *R. bicornis* of Africa, it had a longer and narrower cranium, more bulky body, and shorter and stouter limbs. It occurs in diluvial sands, in caverns, and in bone breccia. This genus has also been found in the tertiary and diluvial deposits of Asia; Cautley and Falconer describe four species among the Sivalik hills of northern Hindostan. The most singular fact in connection with the geological distribution of the rhinoceros is its occurrence during the diluvial period in America, like the elephant not now existing on this continent; several species differing from *R. tichorhinus* are described by Profs. Leidy, Marsh, and others, from the tertiary of Nebraska, Texas, the upper Missouri, California, and the neighboring territories. The genus *elasmotherium* of Fischer probably comes near if not in the rhinoceros family; judging from the teeth, and the size, form, and thickness of jaw, it must have been an animal of heavy proportions, with the size and habits of the rhinoceros, and essentially herbivorous; it was found in Siberia. The family *brontotherida*, so fully

described by Profs. Marsh and Cope, from the miocene of Colorado and the adjoining territories, seems to have combined some of the characters of the rhinoceros and elephant, which succeeded them in the pliocene period.

RHINOCEROS HORNBILL. See HORNBILL.

RHINOPLASTY. See AUTOPLASTY.

RHIZOPODS. See FORAMINIFERA, GLOBIGERINA, and PROTOZOA.

RHODE ISLAND, one of the thirteen original states of the American Union and one of the New England states, the smallest of the 37 of which the Union is now composed. It is bounded N. and E. by Massachusetts, S. by the Atlantic ocean, and W. by Connecticut, and lies between lat. $41^{\circ} 9'$ and $42^{\circ} 8' N.$, and lon. $71^{\circ} 8'$ and $71^{\circ} 53' W.$; extreme length N. and S. $47\frac{1}{2}$ m., greatest breadth E. and W. 40 m.; area, 1,306 sq. m. It is divided into five counties: Bristol, Kent, Newport, Providence, and Washington. These are subdivided into two cities, Providence (pop. in 1875, 100,675) and



State Seal of Rhode Island.

Newport (pop. 14,028), and 34 towns. Providence and Pawtucket, which had 68,904 and 6,619 inhabitants respectively in 1870, have since received territory from North Providence. The largest towns are Pawtucket (pop. in 1875, 18,464), Woonsocket (13,576), Warwick (11,614), Lincoln (11,565), Bristol (5,829), Cranston (5,688), Westerly (5,408), Burrillville (5,249), Johnston (4,999), Coventry (4,580), and South Kingstown (4,240). The population of Rhode Island in 1730 was 17,935; in 1755, 40,414; in 1770, 59,678. According to the federal enumerations, it has been as follows:

CENSUSES.	White.	Free colored.	Slave.	Aggregate.
1790.....	64,470	3,407	945	68,825
1800.....	65,438	3,304	380	69,122
1810.....	73,214	3,609	108	76,931
1820.....	79,413	3,554	43	83,050*
1830.....	93,621	3,561	17	97,199
1840.....	105,587	3,288	5	108,830
1850.....	143,875	3,670	..	147,545
1860.....	170,649	3,952	..	174,620
1870.....	212,219	4,980	..	217,353

* Including 44 persons not classified.

RHODE ISLAND



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The aggregate included 19 Indians in 1860, and 154 in 1870. The gain in population from 1860 to 1870 was 24.47 per cent. Rhode Island at the latter date had 166,43 inhabitants to a square mile, being next to Massachusetts the most densely populated state in the Union. The total population in 1875, according to the state census, was 258,239. Of the population in 1870, 161,957 were natives and 55,396 foreigners, 104,756 males and 112,597 females. Of the natives, 125,269 were born in the state, 18,719 in Massachusetts, 5,524 in Connecticut, 3,932 in New York, 1,875 in Maine, and 1,242 in New Hampshire. There were 45,371 persons born in the state living in other parts of the Union. Of the foreigners, 42,984 were natives of the United Kingdom (31,534 Irish, 9,291 English, and 1,948 Scotch), 10,242 of British America, and 1,201 of Germany. There were in the state 27,834 males and 27,941 females between 5 and 18 years of age, 44,377 males between 18 and 45, and 58,752 males 21 years old and upward, of whom 43,996 were citizens of the United States and 14,756 unnaturalized foreigners. There were 46,133 families, with an average of 4.71 persons to each, and 34,828 dwellings, with an average of 6.24 to each; 15,416 persons 10 years old and upward who could not read, and 21,921 who could not write, of whom 4,444 were native and 17,477 foreign born, 2,531 between 10 and 15 years of age, 2,588 between 15 and 21, and 16,802 21 and upward, of whom 6,218 were males and 10,584 females. The number of blind persons was 121; of deaf and dumb, 64; of insane, 312; of idiotic, 123. The number of paupers supported during the year ending June 1, 1870, was 1,046, at a cost of \$97,702; receiving support on that date, 634, of whom 192 were foreigners; persons convicted of crimes during the year, 209; in prison on June 1, 180, of whom 55 were foreigners. Of the 88,574 (66,859 males and 21,715 females) persons 10 years old and over returned as engaged in all occupations, 11,780 were employed in agriculture, 19,679 in professional and personal services, 10,108 in trade and transportation, and 47,007 in manufactures, including 20,504 cotton and woollen mill operatives. The number of deaths, according to the census of 1870, was 2,741, of which 552 were from consumption and 169 from pneumonia. Rhode Island was formerly the abode of the Narragansett Indians, a large and powerful tribe, of which there is a small remnant. In 1709 the sachem Ninegret gave a quitclaim to the colony of all the Indian lands, except a reservation in the town of Charlestown, portions of which have from time to time been sold. Of this reservation there remains 2,685 acres, 637 of which are arable, and the remainder swamp and timber lands. The tribe now consists of fewer than 150 persons, all of whom are of mixed blood. They possess a church and a school house, and about a third of the tribe can read and write.—The surface of the state is gen-

erally rough and hilly, but has no elevations which can with propriety be called mountains. Mt. Hope, the seat of the famous Indian king Philip, near Bristol, is a considerable elevation, but the hills near Woonsocket in the north, and Hopkins hill near the centre of the state, have a greater height above the sea. Narragansett bay, which divides the state into two unequal parts, leaving far the greater portion on the west, extends N. from the Atlantic ocean a distance of 28 m. It is from 3 to 12 m. wide, and holds in its embrace the islands of Aquidneck, or Rhode island, Canonicut, Prudence, and several smaller ones. The first named, which has been called the "Eden of America," is 15 m. long, from 3 to 3½ m. wide, and contains about 50 sq. m. It comprises the city of Newport, the town of Middletown, and the greater part of Portsmouth. Newport, near its S. end, is a celebrated watering place. Newport harbor, which lies between Canonicut and Rhode island, is one of the finest in the world, and has a depth of water sufficient for the largest ships. Canonicut is 7 m. long and about 1 m. wide, and forms the town of Jamestown. Prudence island lies N. E. of Canonicut, and is of less extent; it forms a portion of the town of Portsmouth. Projecting southward from the mainland on the east is a peninsula which divides Narragansett bay and forms Mt. Hope bay, at the head of which Taunton river enters. In the Atlantic, about 10 m. S. by W. of Point Judith (at the W. entrance of Narragansett bay), is Block island, so named from the Dutch captain Adriaen Block, who visited it in 1614; it is 8 m. long by from 2 to 5 m. wide, contains a large salt pond, and forms the town of New Shoreham, Newport co. The islanders support themselves chiefly by fishing. Sheep in considerable numbers are raised, and excellent butter and cheese are made there.—The rivers in the state are small, but have considerable falls, and their waters are used over and over again during their whole course for manufacturing purposes. The Pawtucket or Blackstone river rises in Massachusetts, runs S., and flows into Providence river. At Pawtucket it has a fall of from 30 to 40 ft., below which it bears the name of Seekonk river. The Woonasquatucket and Mooshassuck flow into a cove within the city of Providence which is connected with Providence river. Pawtucket river enters Narragansett bay 5 m. below Providence. It courses through the central parts of the state and abounds with falls; hence it is used to its full extent for mills and various kinds of manufacturing establishments. Pawcatuck river waters the S. W. section of the state, and falls into Stonington harbor; along its course are many thriving manufacturing villages. Providence river is the northern arm of Narragansett bay, and is navigable to Providence for ships of 1,500 tons burden.—The western portions of the state are very uniform and simple in their geological character,

the primary stratified and unstratified rocks generally prevailing with great uniformity. Cumberland in the north, on the contrary, is a very complicated geological district. As a general thing it may be said that the geological formation which distinguishes S. E. Massachusetts extends to the N. parts of Rhode Island. The S. section is chiefly of a later era. Anthracite coal of an inferior quality exists in Cumberland and on Rhode island, in both of which localities it has been mined to a considerable extent. Iron ore is found in several places. Limestone abounds in the N. section, and there are some excellent quarries of marble, freestone, and granite. Serpentine is also abundant.—The climate of the whole state is mild, owing to its proximity to the sea. Newport and its vicinity, more affected by the vapors from the Atlantic, is milder than the N. parts of the state. The soil is moderately fertile, but rough in many parts and difficult of cultivation. The island of Rhode Island was formerly well wooded, but it was entirely denuded of its forest trees while in possession of the British in the revolutionary war. It is now noted for its fine cattle, sheep, butter, and cheese. The soil of the islands is slaty, yet they are the most productive portions of the state. There is very little alluvial land. Pine plains are found in several places. Oak, walnut, and chestnut are the prevailing growth, with some pine. In the S. parts are some large cedar swamps. Indian corn, rye, and oats are the principal cereals. Wheat is rarely sown. On the whole the lands are better adapted to grazing than to the cultivation of cereals. The number of acres of improved

land in farms in 1870 was 289,030; of farms, 5,368, of which 440 contained less than 10 acres each, 719 between 10 and 20, 1,960 between 20 and 50, 1,488 between 50 and 100, 750 between 100 and 500, and 11 more than 500; cash value of farms, \$21,574,968; of farming implements and machinery, \$786,246; wages paid during the year, including value of board, \$1,124,118; estimated value of all farm productions, including betterments and additions to stock, \$4,761,163; value of orchard products, \$43,036; of produce of market gardens, \$316,133; of forest products, \$254,683; of home manufactures, \$37,847; of animals slaughtered or sold for slaughter, \$755,552; of live stock, \$3,135,132. The productions were 784 bushels of wheat, 20,214 of rye, 311,957 of Indian corn, 157,010 of oats, 33,559 of barley, 1,444 of buckwheat, 9,920 of peas and beans, 669,408 of Irish potatoes, 142 of sweet potatoes, 954 of clover seed, 1,938 of grass seed, 796 lbs. of tobacco, 77,328 of wool, 941,199 of butter, 81,976 of cheese, 249 of hops, 498 of wax, 6,290 of honey, 20 gallons of sorghum molasses, 765 of wine, 1,944,044 of milk sold, and 89,045 tons of hay. The live stock on farms included 7,770 horses, 43 mules and asses, 18,806 milch cows, 5,821 working oxen, 9,748 other cattle, 23,938 sheep, and 14,607 swine; besides which there were 3,343 horses and 5,730 cattle not on farms.—Manufacturing is the most important interest of the state. The chief water power is in Providence and Kent counties. The city of Providence is largely engaged in manufacturing by steam power. The following table is compiled from the last three federal censuses:

YEAR.	Number of establishments.	Number of hands employed.	Amount of capital invested.	Annual wages.	Value of materials used during year.	Value of annual product.
1850.....	864	20,967	\$12,985,676	\$5,047,030	\$13,186,703	\$22,117,683
1860.....	1,191	32,490	24,278,295	8,760,125	19,858,515	40,711,296
1870.....	1,550	49,417	66,557,322	19,354,256	73,154,109	111,418,354

Of the hands employed in 1870, 28,804 were males above 16, 14,752 females above 15, and 5,861 youth. The motive power was furnished by 402 steam engines of 23,546 horse power, and 456 water wheels of 18,481 horse power. In that year, though 32d among the states in population, Rhode Island was 10th in the value

of manufactures. In proportion to population it ranked first, averaging \$512 61 of manufactured products to each inhabitant. The following table gives the statistics for 1870 of the leading branches, together with the rank of Rhode Island and the states that surpass it in value of products in each branch:

INDUSTRIES.	Establishments.	Hands.	Capital.	Value of materials.	Value of products.	Rank.	States superior in value of products.
Cotton goods.....	140	16,872	\$18,848,300	\$13,286,315	\$22,072,208	2	Mass.
Woollen goods.....	65	6,363	8,167,500	8,089,948	12,558,117	5	Mass., Pa., Conn., N. Y.
Worsted goods.....	11	1,631	2,900,000	1,736,210	2,835,950	3	Mass., Pa.
All textiles*.....	219	25,054	30,352,800	23,280,096	37,907,670	3	Mass., Pa.
Printing cotton and woollen goods.....	9	2,996	6,770,000	14,604,962	17,842,450	1	.....
Bleaching and dyeing.....	15	780	1,474,000	13,842,026	15,138,723	2	Mass.
Cotton and woollen machinery.....	70	3,087	9,583,060	1,412,715	4,816,376	2	Mass.
Jewelry.....	71	1,579	1,850,400	1,858,581	3,043,846	3	N. Y., N. J.
Plated ware.....	9	380	634,700	564,900	1,212,240	2	Conn.
Screws.....	2	972	7,080,000	718,465	1,882,318	1	.....
India-rubber and elastic goods.....	2	845	403,000	901,053	1,804,568	5	Conn., Mass., N. Y., N. J.

* Including cotton, woollen, worsted, and linen goods.

—Rhode Island is divided into three customs districts, Bristol and Warren, Newport, and Providence. The direct foreign commerce is not extensive, but there is a large coasting trade. The statistics of the foreign commerce

for the year ending June 30, 1875, including imports and exports and entrances and clearances, with the number and tonnage of vessels belonging in the different districts on that date, are contained in the following table:

DISTRICTS.	Imports.	Exports.	ENTRANCES.		CLEARANCES.		BELONGING.	
			No.	Tons.	No.	Tons.	No.	Tons.
Bristol and Warren.....		\$5,100	...	...	1	191	20	1,265
Newport.....	\$1,750	11,632	6	617	5	620	137	6,643
Providence.....	312,950	23,088	143	22,590	125	19,636	182	36,485
State.....	\$314,700	\$39,820	154	23,207	131	20,447	289	44,593

Of the vessels belonging in the state, 48, with an aggregate tonnage of 21,570, were steamers. Cod and mackerel fishing for the New York and other markets is carried on to a considerable extent, chiefly from Newport. The number of vessels engaged in this business on June 30, 1875, was 105, with an aggregate tonnage of 1,547. Menhaden, scup, and bluefish are also extensively caught, while clams and other shellfish are abundant on the shores of Narragansett bay. The latest published statistics of the coasting trade, for the year ending June 30, 1875, are as follows:

DISTRICTS.	ENTRANCES.		CLEARANCES.	
	No.	Tons.	No.	Tons.
Bristol and Warren.....	39	5,471	61	50,561
Newport.....	330	801,948	327	806,039
Providence.....	844	748,765	157	113,923
State.....	1,213	1,556,184	545	969,623

Rhode Island is well supplied with railroads. The particulars of the different lines at the beginning of 1875 are shown in the following table:

LINES.	TERMINI.	Length in state.	Total length when different from preceding.
Boston and Providence.....	Boston, Mass., to Providence.....	101½ m.	44 m.
Boston, Hartford, and Erie (Woonsocket division)	Brookline, Mass., to Woonsocket.....	1 "	32½ "
Fall River, Warren, and Providence.....	Warren to Fall River, Mass.....	9 "	5½ "
Hartford, Providence, and Fishkill.....	Providence to Waterbury, Conn.....	26½ "	122½ "
Newport and Wickford.....	Wickford Junction to Wickford, opposite Newport	45 "	62½ "
New York, Providence, and Boston.....	Groton, opp. New London, Conn., to Providence.	2 "	67½ "
Old Colony.....	Boston, Mass., to Newport.....	14½ "	.....
Pawtuxet Valley.....	River Point to Hope.....	2½ "	.....
Providence and Springfield.....	Providence to Pascoag.....	23 "	.....
Providence and Worcester.....	Providence to Worcester, Mass.....	18 "	44½ "
Providence, Warren, and Bristol.....	Providence to Bristol.....	13½ "	.....
Warwick.....	Auburn to Coweset Bay.....	8½ "	.....
Wood River branch.....	Wood River Junction to Locustville.....	5½ "	.....
Total.....		176 m.	.....

There are 62 national banks, which on Oct. 2, 1874, had an aggregate capital of \$20,504,800; outstanding circulation, \$12,990,605; individual deposits, \$7,930,653 64; total assets, \$49,008,801 37. The number of state banks is 15 (12 in Providence and 3 in Newport), which on Dec. 2, 1874, had an aggregate paid-in capital of \$3,210,000, and deposits to the amount of \$1,537,701 22; total assets, \$5,229,253 46. The institutions for savings, 37 in number, on the same date had 98,359 depositors and de-

posits to the amount of \$48,771,501 86. The aggregate assets amounted to \$50,540,703 19. The condition of the Rhode Island Hospital trust company in Providence, the only one in the state, was as follows: capital, \$500,000; deposits, \$1,935,520 59; moneys in trust, \$3,696,344 43; total assets, \$6,694,862 65. The following are the statistics of the fire, fire and marine, and life insurance companies authorized to transact business in the state on Jan. 1, 1875:

COMPANIES.	Number.	Capital paid up.	Gross assets.	Liabilities, including reinsurance.	Surplus as to policy holders.
Fire, &c. { Rhode Island companies.....	23	\$1,300,000	\$3,103,200	\$1,272,271	\$1,580,929
{ Companies of other states.....	102	32,132,270	79,720,055	31,966,194	47,753,861
{ Foreign companies.....	13	.....	14,595,821*	7,204,276*	7,391,044*
Life companies of other states.....	31	4,476,000	331,073,845	292,353,751	38,725,064

—The official designation of the state is "the state of Rhode Island and Providence Plantations." The government is vested in a governor (salary \$1,000), lieutenant governor

(\$500), secretary of state (\$2,500 and fees), attorney general (\$2,500), treasurer (\$2,000),

* In the United States.

and a general assembly consisting of a senate and house of representatives. They are all elected annually by the qualified voters on the first Wednesday of April. An auditor (salary \$1,500) is chosen annually by the general assembly. The senate consists of the lieutenant governor and one member from each city and town in the state. The governor, and in his absence the lieutenant governor, presides, voting only in case of a tie. The secretary of state is *ex officio* secretary of the senate. The house of representatives cannot exceed 72 members, apportioned among the cities and towns according to population after each census; but each town is entitled to at least one representative, and none can have more than 12; the latter number is sent by the city of Providence. The pay of the members is \$1 a day and 8 cents for every mile travelled. The present number of senators is 36 and of representatives 72. Rhode Island has two capitals, Providence and Newport, the general assembly holding annually its regular session in the latter city commencing on the last Tuesday of May, and a session by adjournment in the former. The pardoning power is vested exclusively in the governor, with the advice and consent of the senate. The judicial power is vested in a supreme court and courts of common pleas. The supreme court has general appellate and original jurisdiction, and consists of a chief justice, with a salary of \$4,500, and three associate justices with salaries of \$4,000 each; they are elected by the general assembly, and hold office until removed by a resolution of both houses. The court of common pleas in each of the five counties is held by a single judge of the supreme court. It has jurisdiction of appeals from justices' and other inferior courts, of crimes not punishable by imprisonment for life, and of civil cases involving \$100 and upward, or the title to real estate. Justices' courts are held in each town and city by a trial justice selected from the qualified justices of the peace. The town councils are courts of probate within their respective towns, though in each a special judge of probate may be elected, who then has exclusive jurisdiction of probate matters. In the city of Providence the municipal court is the court of probate. Voters must be male citizens of the United States 21 years old and upward. Naturalized citizens must also be possessed of a freehold of \$184 or renting for \$7 per annum, and have resided one year in the state and six months in the town or city in which they offer to vote. Native-born citizens may vote upon the same qualifications; they may also vote, without the property qualification, if they have resided two years in the state and six months in the town or city, have been registered on or before the last day of December preceding the election, and have within a year paid taxes amounting to \$1 or served at least one day in the militia. But no person can vote "upon any

proposition to impose a tax, or for the expenditure of money in any town or city, unless he shall, within the year next preceding, have paid a tax assessed upon his property therein, valued at least at \$134." The distinction between native and naturalized citizens is not expressly stated in the constitution, but rests upon a reference in that instrument to the act calling the convention to frame it. The voting for general state officers and for representatives in congress must be by ballot; voting for senators and representatives in the general assembly and for town or city officers is by ballot when demanded by any seven persons entitled to vote for those officers. In all elections a majority of all the electors voting is necessary to a choice. If there be no choice for governor or other state officers, the election is made by the general assembly in joint session from the two candidates having the greatest number of votes. In the case of senators and representatives, a new election is held by the people until some candidate receives a majority. Amendments to the constitution must be adopted by a majority of all the members elected to each house of two successive legislatures, and subsequently by a three-fifths vote of the people. Rhode Island is entitled to two representatives and in common with the other states to two senators in congress, and has thus four votes in the electoral college.—The valuation of the real and personal property of the state according to the federal censuses has been as follows:

YEARS.	ASSESSED VALUE.			True value of real and personal estate.
	Real estate.	Personal estate.	Total.	
1850....				\$80,508,794
1860....	\$83,778,204	\$41,326,101	\$125,104,305	135,337,583
1870....	132,876,581	111,402,273	244,278,854	296,965,646

The total taxation not national in 1870 was \$2,170,152, of which \$489,253 was state and \$1,680,899 town, city, &c.; total public debt, \$5,938,642, of which \$2,913,500 was state and \$3,025,142 town, city, &c. The receipts and payments into and from the state treasury during the year ending April 30, 1875, were as follows:

Balance in treasury May 1, 1874.....	\$294,300 63
RECEIPTS.	
State tax	\$492,418 77
Institutions for savings.....	112,923 17
State insurance companies.....	18,389 81
Foreign insurance agents.....	33,405 90
Courts and justices.....	34,905 88
Jailers.....	4,153 39
Auctioneers.....	1,810 02
Town councils.....	3,069 73
Peddlers' licenses.....	3,700 00
Dividends on the school fund.....	22,092 50
Charters.....	5,750 00
Interest on deposits of revenue.....	16,412 62
Miscellaneous.....	9,243 98
	\$763,216 07
Total.....	\$1,057,582 15

PAYMENTS.

Salaries.....	\$58,008 31	
Expenses of general assembly....	21,582 76	
Courts and justices.....	54,825 51	
Public printing.....	10,170 38	
Charities and corrections.....	65,000 00	
Public schools.....	90,000 00	
Special appropriations.....	6,276 33	
Insane and other dependents.....	9,902 71	
Jailers.....	1,520 03	
Reform school.....	20,955 43	
Military.....	19,896 11	
Normal school.....	10,000 00	
Law library.....	1,592 01	
Court houses and jails.....	2,072 89	
Interest on state debt.....	160,530 00	
Inland fisheries.....	1,263 43	
Mileage, state normal school.....	1,477 80	
Evening schools.....	2,218 00	
New state prison.....	10,000 00	
Miscellaneous.....	84,045 17	
		\$581,731 92
Balance in treasury April 30, 1875.....		\$475,850 23

The funded debt of the state at the above date amounted to \$2,563,500.—The state institutions are the state prison in Providence, and the workhouse and house of correction, the state asylum for the incurable insane, and the state almshouse on the state farm (418 acres) in Cranston. The state prison and Providence county jail (on the same premises) are under the management of a board of seven inspectors appointed annually by the governor, who serve without pay. The labor of the prisoners is let to contractors, and is employed in the manufacture of furniture and wire goods and in chair seating. The number of convicts in prison during the year ending Jan. 1, 1875, was 101; remaining on that date 67; number of persons in jail during the year, 2,618; remaining at the close, 147. The receipts of these institutions amounted to \$23,428 93, of which \$14,715 42 were from labor; ordinary expenses, \$22,967 46. The institutions on the state farm are under the management of a board of state charities and corrections, consisting of six members appointed by the governor and senate for six years (one retiring annually). These serve without pay, and appoint a secretary, who is *ex officio* a member of the board. The board appoints a superintendent of state charities and corrections. The state almshouse, for paupers not having a legal settlement in any town, was opened on Aug. 1, 1874. The following statistics are for the year ending Jan. 1, 1875:

INSTITUTIONS.	Inmates during year.	Inmates at close of year.
Workhouse and house of correction.....	735	199
Asylum for incurable insane.....	207	172
Almshouse (five months).....	196	141

Of the insane in the asylum on Jan. 1, 1875, 62 were supported wholly by the state; the board of the others was paid by the towns or by friends of the patients at from \$2 to \$4 per week. The average number of paupers in the town asylums during the year ending June 1,

1874, was 472, and they were supported at the cost of \$32,082 89, exclusive of the income of the farms connected with the asylums. The Butler hospital for the insane in Providence is a corporate institution, but some poor patients are supported at the expense of the state or of the towns. It was opened in 1848. A fine farm is connected with it. The number under treatment during 1874 was 234; remaining at the close of the year, 127. The greater number are supported from private means. The number of public patients during the year was 40, at the close 16; toward the maintenance of these \$1,630 18 was paid by the state and \$1,817 28 by the towns. The entire net expenditure of the institution was \$55,217 44. The Providence reform school is a city institution, but it receives children and youth from all parts of the state. It was opened in 1850. The number of inmates during the year ending Nov. 30, 1874, was 369 (314 boys and 55 girls); remaining on that date, 220 (179 boys and 41 girls). The receipts during the year were \$41,699 79, of which \$20,955 71 were from the state; expenditures, \$41,295 38.—The public schools are under the management of a board of education, consisting of the governor and lieutenant governor *ex officio*, and six members elected by the general assembly for three years (two retiring annually). The members serve gratuitously. The board elects annually a commissioner of public schools (salary \$2,500), who also acts as its secretary. A school committee, varying in number, is elected in each town by the qualified voters for three years. Women are eligible to the committees. There is a board of trustees for each district, elected by the qualified voters. The schools in the city of Providence are governed by ordinances and regulations adopted by the city authorities. The public schools are free, and are supported by state, town, and district taxes. The following are the statistics for 1873-'4:

Number of school districts.....	429
“ of day schools.....	732
Average length of schools.....	8 mos. 19 days
Number of different teachers (201 males and 821 females).....	1,022
Number of teachers necessary.....	805
Estimated number of children in state between 5 and 15.....	43,500
Number of different pupils enrolled.....	89,401
Average attendance.....	24,434
Number of evening schools.....	52
Average length of schools.....	13½ weeks
Number of different teachers (89 males and 119 females).....	208
Number of different pupils enrolled.....	6,083
Average attendance.....	2,980
Amount of permanent school fund.....	\$250,376 37
Number of teachers reported in schools other than public (80 males and 76 females).....	156
Number of pupils in do.....	8,527

RECEIPTS FOR PUBLIC SCHOOLS.

State appropriation for day schools.....	\$90,000 00
“ for evening schools.....	8,314 00
Town appropriations.....	325,322 37
From registry taxes and other sources.....	210,355 40
District taxes.....	66,881 59
Balance unexpended last year.....	46,896 24
Total receipts from all sources.....	\$745,769 60

EXPENDITURES.

Paid teachers in day schools.....	\$355,525 90
Paid for other purposes connected with day schools.....	76,016 50
Expended for evening schools.....	22,127 50
Expended for school houses.....	237,181 33
Total expenditures.....	\$690,851 53

More than half of the schools are graded. The following cities and towns have high schools, or schools of an equal grade, either public or private: Providence, Newport, Woonsocket, Pawtucket, Bristol, Warren, Westerly, Lincoln, East Greenwich, Barrington, Scituate, and East Providence. Children under 15 years of age employed in manufactories are required to attend school at least three months in the year. The state normal school is in Providence. Tuition is free to such as intend to teach in the public schools of the state. The number of instructors is 8; number of pupils in 1873-'4, 141. The most important institution of learning in the state is Brown university at Providence, founded in 1764. By a legislative act of 1862 it received the congressional land grant of 120,000 acres for the establishment of a college of agriculture and the mechanic arts. This has been sold for \$50,000, and entitles the state to the gratuitous tuition of 30 students in those branches. In 1874-'5 the university had 11 professors, 4 instructors, 253 students, and a library of upward of 40,000 volumes. (See BROWN UNIVERSITY.) The number of libraries, according to the census of 1870, was 759, with 693,387 volumes, of which 425, with 383,691 volumes, were private, and 334, with 309,696 volumes, not private, viz.: 1 state, 1,500 volumes; 10 town, city, &c., 15,198; 5 court and law, 2,147; 12 school, college, &c., 97,500; 248 Sabbath school, 116,441; 26 church, 11,160; 32 circulating, 65,750. There were 32 newspapers and periodicals, having an aggregate circulation of 82,050, and issuing 9,781,500 copies annually, viz.: 6 daily, circulation 23,250; 1 semi-weekly, 1,200; 19 weekly, 43,950; and 6 monthly, 13,650. The statistics of churches, according to the census, are as follows:

DENOMINATIONS.	Organizations.	Edifices.	Sittings.	Value of Property.
Baptist, regular.....	75	73	23,695	\$719,400
" other.....	34	34	11,191	153,000
Christian.....	12	12	3,050	33,500
Congregational.....	27	27	18,500	620,000
Episcopal.....	42	39	17,155	735,100
Friends.....	17	17	5,514	58,600
Jewish.....	1	..	.....	.....
Lutheran.....	1	1	400	1,500
Methodist.....	33	30	14,605	371,300
New Jerusalem (Swedenborgian).....	3	2	675	5,500
Presbyterian.....	1	1	500	10,000
Roman Catholic.....	22	20	19,103	910,100
Second Advent.....	17	14	3,370	28,700
Spiritualist.....	1	..	.....	.....
Unitarian.....	4	4	3,450	229,000
Universalist.....	4	4	2,770	220,000
Unknown (local mission).....	1	1	500	10,000
Unknown (union).....	..	4	700	6,500
Total.....	295	283	125,183	\$4,117,200

—Geographers have recently fixed upon Rhode Island as the ancient Vinland, said to have been discovered by the Northmen about A. D. 1000 (see NORTHMEN); indeed, if reliance is to be placed on the Icelandic sagas, a critical examination of them leads to this result. In 1524 Verrazzani, coasting eastward from a bay which has been identified as that of New York, passed up an opening into a large bay where he remained a fortnight. There is little doubt that this was Narragansett bay, and that he first came to anchor in Newport harbor. He held a friendly intercourse with the natives, who visited his vessel in great numbers. The country was then very thickly populated. Many have believed that the "old stone mill," an interesting ruin in Newport, long the puzzle of antiquaries, was the work of some of the early European navigators who followed Verrazzani, while the Danish antiquaries claim it as a work of the Northmen. It was used for a grist mill by the settlers who accompanied Williams and Coddington to Rhode Island, and was probably erected by them for that purpose. The celebrated Dighton rock, on Taunton river, a few miles from Mt. Hope bay, bearing a variety of strange figures, has been claimed by the Danish antiquaries as a memorial of the visit of the ancient Northmen under Thorfin in the 10th century. They have even gone so far as to attempt to trace out the name of this hero among the rude sculptures on the rock. Rhode Island was first settled at Providence (so called in grateful acknowledgment of "God's merciful providence to him in his distress") in the year 1636 by Roger Williams, who had been banished from Massachusetts for maintaining opinions in political and religious matters at variance with those of the rulers in that colony. He immediately put into practice the doctrine of liberty of conscience. In 1638 William Coddington and some others, who were also persecuted and forced to leave Massachusetts for religious opinions, deemed to be heresies there, purchased from the Indians the island of Aquidneck or Aquiday, afterward called Rhode island, and effected a settlement there, from which sprung the towns of Newport and Portsmouth. A third settlement was formed at Warwick in 1643, by a party among whom John Greene and Samuel Gorton were prominent. The same year Williams went to England and obtained a patent for the united government of the settlements, dated March 14, 1643-'4, which did not go into operation till 1647. This patent remained in force till 1663, when a charter was obtained from Charles II., incorporating the colony of "Rhode Island and Providence Plantations," which was the only constitution of government for 180 years. The great war between the English settlers and the Indian tribes of New England broke out in June, 1675. Rhode Island suffered severely from it. Many towns, villages, and farm houses were burned, and families

butchered. Providence, among others, was burned. The war only terminated with the death of Philip, king of the Wampanoags, a powerful tribe which dwelt on the eastern shore of Narragansett bay, in August, 1676. But the great contest in this war, and which decided the fate of the Indians, took place in December previous in the "Narragansett country," so called, in the S. part of the state, the seat of the great and powerful tribe of Narragansetts. Here the Indians had collected in great numbers and fortified themselves, on a rising ground in the centre of a dense swamp. A considerable force was sent against them from Massachusetts, Plymouth, and Connecticut. The Indians were defeated with great loss, many perishing in the flames that destroyed their village. The loss of the colonists was also severe. Rhode Island was opposed to this exterminating war, and was not even consulted in regard to it by the other colonies. In January, 1687, Sir Edmund Andros, having been commissioned as governor of New England, New York, &c., abrogated the charter of Rhode Island, with those of other colonies, which then became a mere county, governed by civil officers appointed by him, till he was seized and sent to England in 1689. Rhode Island took a prominent part in the struggle between Great Britain and France for empire in America. She furnished large numbers of troops for the expeditions against Louisburg, Crown Point, Oswego, and Canada; but it was on the ocean that she rendered the most important service. In 1756 she had 50 privateers at sea, manned by upward of 1,500 men, which cruised along the coast and among the West India islands, making many captures. In the war of the revolution the first naval squadron sent against the enemy was fitted out and sailed from Providence under command of Commodore Hopkins, who was styled admiral. Commodores Whipple and Talbot also sailed from and belonged to Rhode Island. Gen. Nathanael Greene was a native of and began his military career in this state. In December, 1776, Rhode Island was invaded by the British, who occupied Newport several years. Gen. Sullivan, aided by a French fleet under Count d'Estaing, made several unsuccessful attempts to dislodge the enemy, and in the autumn of 1778 laid siege to Newport, but was finally obliged to abandon the project. Toward the close of 1779 the British troops were withdrawn, and the following year Rochambeau arrived with 6,000 French auxiliaries. Rhode Island was the last of the thirteen colonies that accepted the constitution of the United States, her assent being given on May 29, 1790. In the war of 1812 with Great Britain the state was made conspicuous by the victory on Lake Erie of Commodore O. H. Perry, a native of this state, won by the aid of a party of seamen and shipwrights from Rhode Island. Under the charter as in force at the breaking out of the revolution the low-

er house of the legislature consisted of six deputies from Newport, four each from Providence, Portsmouth, and Warwick, and two from each of the other towns. The right of suffrage was restricted to owners of a freehold worth £40 or \$134, or renting for 40s. or \$7 a year, and to their eldest sons. In process of time the property qualification and the inequality of representation, which continued to increase, caused much dissatisfaction. In 1840 Providence with only four representatives had 23,171 inhabitants, while Newport with six representatives had only 8,333 inhabitants. Of the 72 representatives elected in that year, 38 were chosen from towns having only 29,026 inhabitants and 2,846 voters, while the remaining 34 were chosen from towns having 79,804 inhabitants and 5,776 voters. Various attempts to obtain reform from the legislature having failed, suffrage associations were organized in the latter part of 1840 and the early part of 1841, which, at a mass convention held at Providence on July 5 of the latter year, authorized their state committee to call a convention to frame a constitution. Delegates were elected on Aug. 28, and on Oct. 4 the convention assembled at Providence. A constitution was framed and submitted to the people on Dec. 27, 28, and 29, when, it was asserted, about 14,000 votes were cast for its adoption, being a majority of the adult male citizens of the state. It was also asserted that a majority of those entitled to vote under the charter voted in its favor. An election for state officers under this constitution was held on April 18, 1842, when Thomas Wilson Dorr, the most prominent leader in the movement, was chosen governor. On May 3 Mr. Dorr's government attempted to organize at Providence and to seize the reins of power. They were resisted by the legal state government, at the head of which was Gov. Samuel W. King. On May 18 a portion of the suffrage party assembled at Providence under arms, and attempted to seize the arsenal, but dispersed on the approach of Gov. King with a military force. They assembled again to the number of several hundred, June 25, at Chepachet, 10 m. from Providence, but upon the approach of the state forces they dispersed without resistance, and the affair was over on the 28th. Mr. Dorr was arrested, tried, and convicted of high treason, and on June 25, 1844, sentenced to imprisonment for life. In 1847 he was released under an act of general amnesty, and in 1851 he was restored to his civil and political rights. In 1854 an act was passed to reverse and annul the judgment in his case, on the ground that the proceedings against him had been illegal and unjust; but the supreme court subsequently declared it unconstitutional, as an assumption of judicial authority by the legislature. In the mean time the legislature on Feb. 6, 1841, called a convention to frame a new constitution. The delegates were elected in August, and the con-

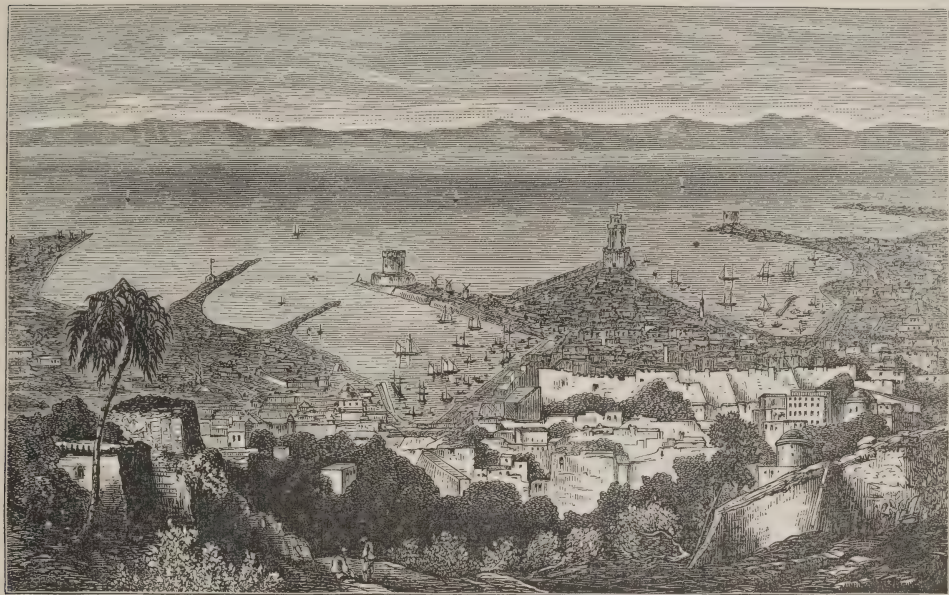
vention assembled in November and adjourned to February, 1842, when they agreed upon a constitution, which was submitted to the people on March 21, 22, and 23, and rejected. In June the legislature called another convention, which met at Providence in September and subsequently adjourned to East Greenwich, where on Nov. 5 it agreed upon the present constitution, which was ratified by the people almost unanimously. It went into effect on the first Tuesday of May, 1843. In 1861 a controversy respecting the boundary with Massachusetts, transmitted from colonial times, was settled by the cession on the part of Rhode Island of that portion of the town of Tiverton containing the village of Fall River, in exchange for the town of Pawtucket and a part of Seekonk (now known as East Providence). In 1861 Rhode Island sent off a body of troops for the defence of Washington three days after President Lincoln issued his call for troops. During the war she furnished 23,711 men to the federal armies, equivalent to 17,878 for three years. (See supplement.)

RHODES (ancient and modern Gr. *Rhodos*, from *ῥόδον*, a rose). **I.** An island of Turkey in the Mediterranean, off the S. W. coast of Asia Minor, from which it is separated by a channel 10 m. wide. It is between lat. 35° 50' and 36° 30' N., and lon. 27° 40' and 28° 20' E.; area, about 452 sq. m.; pop. about 34,000, of whom about 7,000 are Turks, 2,000 Jews, and the remainder Greeks, with a few hundred Franks or Europeans. It is ruled by a pasha, who holds office for life, governing also the adjoining islands belonging to Turkey, and who farms the revenues. It is the seat of an archbishop of the Greek church. The island is divided lengthwise, N. and S., by a mountain chain or ridge. The loftiest summits are Artamiti, the ancient Atabyris, about 6,000 ft. high, and Attairo, 4,000 ft. The most considerable river is the Fisco. The well watered and fertile valleys are not fully cultivated. Some cotton is grown, and a tract of low hills next to the coast district still produces the perfumed wine for which the island was once celebrated. The climate is said to be the finest in the Mediterranean. Commerce is carried on in oil, oranges, citrons, coral, sponges, leather, and marble.—The earliest historical inhabitants of Rhodes were of Doric race, and the three most ancient towns of the island, Lindus, Ialysus, and Camirus, formed, together with Cos, Cnidus, and Halicarnassus on the mainland, the confederation called the Doric hexapolis. At a remote period Rhodes was populous and prosperous. It was one of the stations of Phœnician commerce, and though in a state of decadence at the time of the fall of Sidon, it continued for several centuries to be one of the principal centres of trade, and sent colonies to Spain, Italy, and Sicily, as well as to the coasts of Asia Minor. In conjunction with Asiatic Greeks and Cnidians, the Rhodians established in 578 B. C. a colony on the N. E.

coast of Spain, to which was given the name of Rhoda (now Rosas.) The island did not take a prominent position among the Grecian states till 408, when the three cities before named joined in building the city of Rhodes, which thenceforth became the capital. The island fell under the dominion of Alexander the Great, but after his death the Macedonian garrison was expelled, and Rhodes entered upon the most glorious epoch of her history, during which her power was admitted by all the surrounding nations, and her dominion, in consequence of her alliance with Rome against Antiochus the Great and others, established for a time over a portion of the adjacent coast of Asia Minor. The Rhodians remained faithful to Rome during the Mithridatic wars, entered actively into her civil wars, and their adhesion to the party of Cæsar was severely punished by the capture and plunder of the city of Rhodes in 42 B. C. From this period the island rapidly declined in political power, though it long continued to be famous as a seat of learning. It was finally deprived of its autonomy by the emperor Vespasian. In 330 the city was made the metropolis of the Provincia Insularum. Upon the ruin of the empire of the East the island fell successively into the hands of the caliphs, the crusaders, and the Genoese; and in 1309 the knights of St. John of Jerusalem, who had been compelled to evacuate Palestine, landed at Rhodes, and under the grand master Foulque de Villaret vanquished the Moslems and Greeks in several encounters, and made themselves masters of the city and the island. The knights held the place for two centuries, and in 1522 Sultan Solymán the Magnificent advanced against it with an army numbering upward of 200,000. There was on the island to oppose this only a force of 6,000, headed by the grand master Villiers de l'Isle-Adam. After a siege that lasted through the whole summer, almost innumerable assaults, and a most heroic defence, the city capitulated in October, and has ever since remained under its present masters. The surviving defenders were allowed to leave the island. (See SAINT JOHN OF JERUSALEM, KNIGHTS OF.) Rhodes has many times been visited by earthquakes; that of April 22, 1863, ruined hundreds of dwellings and destroyed thousands of lives. There are now on the island about 44 villages, thinly populated. **II.** The chief city and capital of the island, on the N. E. coast; pop. about 20,000, Turks, Greeks, and Jews. It is built in the form of an amphitheatre upon a bay between two capes, and is surrounded by ancient walls and towers built by the knights of St. John. There are two harbors, separated by a narrow quay. The palace of the grand master was a large and handsome building and commanded the city; it was much injured by the explosion of a powder magazine in 1856, and the earthquake of 1863 completely destroyed it, as well as the once magnificent church of St. John, then a

Turkish mosque. There are no considerable remains of an earlier time than the residence of the knights of St. John, among which is a moated castle of great size and strength, containing the cloisters of the knights. The city of Rhodes, which in 304 B. C. withstood a

famous siege by Demetrius Poliorcetes, is described by Strabo as superior to all other cities for the beauty and convenience of its ports, streets, walls, and public edifices, all of them profusely adorned with works of art. There are said to have been about 3,000 statues in



Rhodes, from the hill northwest of the city.

the city. It contained one of the seven wonders of the ancient world in its brazen statue of Apollo, commonly called the colossus of Rhodes. (See *COLOSSUS*.)

RHODES, Inner and Outer. See APPENZELL.

RHODEZ. See RODEZ.

RHODIUM, a metal belonging to the platinum group, discovered by Wollaston in 1803. He found 0.4 per cent. in ore from Brazil, and in a specimen from another locality as much as 3 per cent. It usually forms about one half of one per cent. of the ore. It may be extracted from the solution from which platinum and palladium have been separated in the manner which has been described. (See *OSMIUM*, *PALLADIUM*, and *PLATINUM*.) The solution is mixed with hydrochloric acid and evaporated to dryness, and the residue is treated with alcohol of sp. gr. 0.837; this dissolves everything except the double chloride of sodium and rhodium, which remains behind as a red powder. This is dissolved in water, and the rhodium precipitated by the action of metallic zinc, or the salt may be reduced by heating it in a current of hydrogen gas. Rhodium is white and very hard. When quite pure it is malleable after fusion upon lime, and is then of sp. gr. 12.1. Wollaston's estimate was 11, but he experimented on the unfused metal. The fusing point of rhodium is higher than that of platinum, and it will only melt in the voltaic arc

or in the oxyhydrogen furnace; the precise degree cannot be estimated. Its symbol is Ro; its atomic weight 104 or 104.3. It is unalterable in the air at ordinary temperatures, but oxidizes, and also combines with chlorine, at a red heat. It resists the action of the strongest acid, singly or combined, unless alloyed with some other metal, when it will dissolve in nitro-muriatic acid. Rhodium forms four oxides: a monoxide, RoO ; a sesquioxide, Ro_2O_3 ; a dioxide, RoO_2 ; and a trioxide, RoO_3 . The principal oxygen salts are the acetate, nitrate, phosphate, sulphate, and sulphite. There are two sulphides, RoS and Ro_2S_3 . According to Berzelius, there are three chlorides, RoCl_2 , Ro_2Cl_3 , and RoCl_3 ; but more recent investigations by Claus make it probable that there is only one, the trichloride, RoCl_3 , which forms double chlorides with the alkalis. The best known salt of rhodium is the sodic rhodic chloride, which is obtained in the extraction of the metal as described above. The rhodic salts generally form rose-colored solutions, and are decomposed by metallic iron or zinc, with precipitation of metallic rhodium. Potassic and sodic hydrates added to rhodic salt solutions slowly precipitate a yellow hydrated rhodic oxide, which is soluble in excess of alkali as well as in acids. Potassic iodide precipitates a sparingly soluble yellow tri-iodide of rhodium. Sulphuretted hydrogen in hot

solutions slowly forms a brown sulphide. Rhodium salts heated in a current of hydrogen gas are reduced to the metallic state.

RHODODENDRON (Gr. *ῥοδὸδένδρον*, rose tree, the ancient name), a genus of plants of the order *ericaceæ* or heath family, to which the name rose bay has been given, but the botanical name is in more common use. The rhododendrons are shrubs or low trees with evergreen, entire, alternate leaves, and (usually) large showy flowers in close terminal clusters, from large scaly-bracted buds. The bell-shaped or funnel-shaped corolla is five-lobed, and often somewhat irregular; the ten stamens (rarely less) are usually declined or bent downward, as is the elongated style; anthers short, opening by terminal pores; pod five-celled, five-valved, and many-seeded. The genus is widely distributed, some species occurring in the arctic zone, others in the temperate portions of North America, still others in Europe and China, while in the mountains of India they are very numerous. Four species are found east of the Mississippi, one of which, the Lapland rhododendron (*R. Lapponicum*), belongs to the arctic flora of both continents, and with us is found only on the alpine summits of the mountains of Maine, New Hampshire, and New York; it is a little, dwarf, prostrate species, with branches only a few inches long, its stems and leaves dotted with rusty scales; the flowers are open, bell-shaped, violet purple and dotted. The great rhododendron (*R. maximum*), also called great laurel, is found sparingly from Maine to Ohio, but is very common in the mountains of the



Hybrid of *Rhododendron Catawbiense*.

middle states, and along the watercourses as far south as Georgia; it flourishes best in deep, damp woods, and in cedar swamps it often forms the principal undergrowth. It is from 6 to 20 ft. high, with the habit of a shrub rather than of a tree. The leaves are

very thick and leathery, from 4 to 10 in. long, elliptical-oblong, acute, narrowed toward the base, somewhat revolute or turned over on the margins, very smooth, and dark green. The flowers appear in July in large clusters, with somewhat viscid stalks; the corolla is an inch broad, white or pale rose-colored, and greenish at the throat on the upper side and spotted with yellow or reddish dots; a variety is sometimes met with having pure white and one with purplish flowers. This species is not common in cultivation, and succeeds best in a shaded situation; some hybrids have been produced from it, but very few in number compared with those from the next. The *Catawba rhododendron* (*R. Catawbiense*) grows on the higher Alleghanies from Virginia to Georgia. It is a compact shrub, from 3 to 6 ft. high; its oval or oblong leaves are rounded at both ends, pale beneath, and 3 to 5 in. long; the broadly bell-shaped flowers are lilac purple, and on (usually) rusty-downy stalks. This species, hybridized with tender exotic species, is the original of the fine ornamental rhododendrons to be mentioned presently. The dotted rhododendron (*R. punctatum*) completes the list of the eastern native species; this is found from the mountains of North Carolina southward, a small-leaved form occurring in West Florida. It grows 4 to 6 ft. high, has leaves 2 to 4 in. long, and, though evergreen, thinner than in the other species, and their lower surface, as well as branchlets, and outside of the flowers, sprinkled with rusty dots; the flowers are rather small and rose-colored.—Two species, both first described and figured by Sir William Hooker, occur in the far west. The white-flowered rhododendron (*R. albiflorum*), first found on the Rocky mountains, and since on the Cascade range, is a low shrub with drooping cream-colored flowers, unlike those of others in appearance. The Californian species (*R. Californicum*), from the mountains of California, has proved hardy in England, and is described as of moderate size, good habit, and having very showy rose-colored flowers.—The most important exotic species is the Pontic rhododendron (*R. Ponticum*), from Pontus in Asia Minor; it is sometimes 20 ft. high, but usually less than half that height. Its obovate-lanceolate leaves taper to the base, and its large, very open bell-shaped corolla is purple, opening in early spring. This is the common rhododendron of European gardens, and, though not generally hardy in our northern states, sometimes succeeds if kept as a low bush and given a slight protection, without which its flower-buds will be winter-killed. Its chief use in this country is to furnish stocks upon which to graft hardier kinds, as it grows readily from seeds. In Europe it has produced a number of varieties, some of which are harder than the species. The tree rhododendron (*R. arboreum*) is a noble species from Nepaul, and still more tender than the Pontic; the dark green leaves

are silvery white beneath, and the large clusters of flowers are scarlet, varying, even in the wild state, through various shades to pure white. The catalogue of varieties is a long one, but they can only be cultivated in the northern states, as in England, under glass, where, when room can be afforded, they make a most brilliant show. Other exotic species seen in rare collections are the yellow-flowered (*R. chrysanthum*), from the Caucasus; the hairy (*R. hirsutum*), very dwarf, with pale red flowers; and the Daurian (*R. Dauricum*), from Siberia, a dwarf species with bright rose-purple and very early flowers; these three are hardy. A magnificent group of rhododendrons is found in the Himalaya, presenting a great variety in foliage and flowers, as well as habit of growth, some of them being epiphytes; they require to be cultivated under glass, both here and in Europe; the majority of these were first made known by Dr. J. D. Hooker, to whose work, "The Rhododendrons of the Sikkim Himalaya," reference may be made for descriptions and colored plates of these wonderfully beautiful plants.—The rhododendrons of our gardens are known as hybrids of *R. Catawbiense*; European horticulturists have long practised hybridizing this species with *R. arboreum*, *R. Ponticum*, and possibly others; among these hybrids are many very beautiful varieties which do not endure northern winters, requiring to be housed; but there are several perfectly hardy varieties, which some experienced cultivators think are not hybrids at all, but merely seedling variations of *R. Catawbiense*. Especial attention is given to these plants in England, and their popularity in this country is increasing. For beauty of form and foliage and profusion and variety in flowers no other shrubs can equal them. Their general cultivation has been hindered by the supposition that they require a peat soil; but the plants, at least those raised in this country, will flourish perfectly well in any good garden soil that is not calcareous; they will not succeed in a heavy clay or on a limestone soil. The varieties are numbered by hundreds; twelve well tested sorts are: *grandiflorum*, *album elegans*, *roseum elegans*, *Everestianum*, *album grandiflorum*, *giganteum*, Lee's dark purple, *gloriosum*, *macranthum*, *purpureum elegans*, *candidissimum*, and *speciosum*. The rhododendrons are exceedingly manageable plants; they may be taken up at almost any time without injury, and when in full bloom may be lifted and used for the decoration of rooms, and set out again without showing the effects of the disturbance. In England the commoner seedlings are largely planted to form game coverts.—But little positive is known about the active properties of our native rhododendrons; narcotic powers are attributed to *R. maximum*, while others regard it as a simple astringent; Michaux says that *R. punctatum* yields a honey that is deleterious, but this

statement needs confirmation. The information in regard to exotic species is hardly more definite; the yellow-flowered rhododendron is said to be narcotic and dangerous. In India the natives eat the flowers of *R. arboreum*, and European residents prepare a conserve from them; this species secretes honey in such quantities that when the bush is shaken it falls like rain in large drops.

RHODOPE. See THRACE.

RHODORA (Gr. ῥόδον, a rose, from the color of the flowers), a native shrub of which the botanical and common names are the same. *R. Canadensis* is the only species, and is by some botanists appended to *rhododendron*, from which it differs in its deciduous leaves and its very irregular flowers, the corolla being two-lipped, the upper lip three-lobed, and the lower two-parted, or of two distinct spreading petals. The shrub is 1 to 3 ft. high, with copper-colored stems and oblong leaves,



Rhodora Canadensis.

revolute on the margin, pale glaucous green above, and whiter and downy beneath. The flowers, in umbel-like clusters, or little tufts, at the ends of the branches, appear just before the leaves, and are of a bright rose-purple and showy; occasionally white-flowered specimens are met with. It is found from Pennsylvania to New England and northward and eastward; it sometimes grows in damp cold mountain woods, but more abundantly in wet marshes, where, especially in the vicinity of Boston, it sometimes covers acres in April or May, with its bright yet modest bloom. Like many other plants, which when growing wild are always found in very wet places, the rhodora succeeds well when transferred to ordinary garden soil, and is a shrub eminently worthy of cultivation.

RHÔNE (anc. *Rhodanus*), a river of Europe, rising in the N. E. corner of the Swiss canton of Valais, not far from the sources of the Rhine, and flowing into the gulf of Lyons in

the Mediterranean sea by two mouths, after a circuitous but general W. and S. course of about 600 m., 350 of which are in France. It originates at the foot of the Mayenwand, on the W. side of the St. Gothard, near the Furca pass, but can scarcely be called a river until its junction with several other streams at the bottom of the Rhône glacier, about 5,500 ft. above the sea. Thence it traverses Valais in a S. W. and then N. W. direction as a mountain torrent, passing by Sion, till it enters the lake of Geneva near its E. extremity, where it has descended upward of 4,000 ft. In this part of its course it receives many small tributaries, the most important of which is the Dranse. When the Rhône enters the lake of Geneva its waters are exceedingly turbid; but on issuing from the S. W. extremity of that lake the river is of a clear blue color, which, however, is changed to brown by the accession of the Arve, a muddy stream, about 1½ m. below Geneva. It flows S. W. for about 15 m. till it enters France, when it turns S. through a narrow pass between the Alps and the Jura. A little way below this place is the Perte du Rhône, where the river descends into a deep chasm partly covered over with massive fragments of rock. The Valsérine, a fine stream from the Jura, joins here from the right. At St. Genix, where the Rhône receives the Guiers from the south, it turns abruptly N. W. and afterward more to the west, till it reaches Lyons, receiving during this part of its course the Ain from the north; and at Lyons it is joined by the Saône, also from the north. The Rhône is here a considerable river, and flows almost due S. to Arles, through a beautiful and fertile country, but the rapidity of the current and the shifting sands in its bed render navigation dangerous and tedious. The most important tributaries in this part of its course, from the Cévennes on the right, are the Doux, Ardèche, Cèze, and Gard; and on the left, from the Alps, the Isère, Drôme, and Durance. At Arles the river separates into two branches, the principal one, called the Grand Rhône, flowing S. E. to the sea, while the other, called the Petit Rhône, flows S. W., enclosing between them the deltoid island of Camargue. The Grand Rhône enters the gulf of Lyons below the Tour St. Louis, and has there commenced the formation of a new delta; and the Petit Rhône has its mouth a little W. of the village of Saintes Maries. Both these mouths are so much obstructed by bars, that vessels from the Mediterranean enter the river by the Étang de Berre, a shore lake or lagoon to the east, which is connected with the Rhône by the Martigues canal, and by the Beaucaire canal, which leads from Arles to the lagoons to the west on the coasts of the departments of Gard and Hérault. Steamers sometimes ascend the Rhône as far as Seyssel, and by means of the Saône it is navigated to Châlon; while by canals it is connected with the Garonne, Seine, Loire, and Rhine. The Rhône is of great

commercial importance, and below Lyons is navigated by numerous steamers. The Paris and Marseilles railway runs along its left bank between Lyons and Arles; and in this part of its course the river passes many considerable towns, the principal of which are Vienne, Tournon, Valence, Avignon, Beaucaire, Tarascon, and Arles. Some of the finest wines of France are produced on the banks of the Rhône below Lyons.

RHÔNE, a S. E. department of France, formed from the old province of Lyonnais, bordering on Saône-et-Loire, Ain, Isère, and Loire; area, 1,077 sq. m.; pop. in 1872, 670,247. The department is traversed in a N. and S. direction by a continuation of the Cévennes; Mont Tarare, the highest summit, is about 3,300 ft. above the sea. The Rhône and Saône form the E. boundary. The soil is not fertile, and only about half the surface is arable; the vine is grown, and some of the wines are excellent. It is divided into the arrondissements of Lyons and Villefranche. Capital, Lyons.

RHUBARB (Lat. *rha*, or *rheu barbarum*, a name given by the early writers), in medicine, the root alone of *rheum officinale* and some other species, but in horticulture the name of the plants of several species. The genus *rheum* (either from Gr. *ρῆν*, to flow, in reference to its purgative properties, or from *Rha*, the ancient name of the Volga, upon the banks of which it grew) belongs to Asia and southern Russia; and growing in localities from which Europeans have been excluded, there has been much confusion as to the species, of which according to Meisner there are about 20. They are all perennials, with large woody rootstocks, from which proceed radical leaves with long, thick petioles, the blade of the leaf usually very broad, entire, or variously lobed, and with strong palmate ribs; the annual stem is erect, large, and hollow, bearing smaller leaves, and spikes or panicles of flowers; all the leaves have large sheathing stipules, but those of the stem leaves are very conspicuous; the apetalous flowers have a white, greenish or pinkish, six-parted calyx; nine stamens; a triangular ovary, surmounted by three styles, and becoming a three-winged fruit. The common rhubarb of the gardens, or pie plant, as it is frequently called, is a familiar representative of the genus; this species, *R. Rhaponticum* (with several synonyms), a native of Siberia and the country along the Volga, was introduced into England as early as 1573, and in the time of Elizabeth its leaves were in use as a pot herb, like spinach. It is now cultivated in gardens solely for its acid petioles or leaf stalks, which are used as a substitute for fruit, a custom unknown until early in the present century. Coming early in spring (and they may be had by forcing at any time during the winter), at a season when fruit is scarce, the leaf stalks are in great demand; their consumption in England is even more general than with us. The rapidly grown stalks contain but little woody fibre,

and cook readily to a pulp, which with sugar is used for pies, tarts, and other culinary preparations; their acidity is due in part to oxalic, but more largely to malic acid, both acids being in combination with potash as acid salts; it disagrees with some, but its large consumption indicates that it is not especially deleterious. About 1860 great efforts were made to establish its use as a wine plant, but the product proved inferior, and was by many considered injurious. There are several garden varieties, as at one time many seedlings were raised with a view to produce plants with the greatest development of leaf stalk; the Cahoon has stalks 3 in. or more in diameter and often 2 ft. long, but it is coarse and harsh in flavor; the best variety is Myatt's Linnaeus, very early, of medium size, tender, and of excellent flavor; Tobolsk is a small kind, very early and good. For field culture the plants are raised in a seed bed, and when a year old are transplanted to 3 or 4 ft. each way; they yield the third year; small plantings are made by dividing the old roots into as many pieces as they have buds, and setting out the pieces; the soil can hardly be too rich. Rhubarb is readily forced by placing the plants in winter in boxes or barrels with earth in a warm cellar, or on a larger scale in frames. In the present style of sub-tropical gardening the rhubarbs are employed on account of their vigor of growth and pic-

are a yard across, and have red veins; this is cultivated in England by gardeners for the sake of its large leaves, which are used for covering baskets of fruit. The finest of all the species is the Himalayan (*R. nobile*), discovered by Dr. J. D. Hooker; it forms a pyramid a yard and more high, the base of which is of shining green leaves with red petioles and nerves, and the upper parts of delicate straw-colored bracts with pink edges.—Rhubarb as a drug has been known from very early times,



Medicinal Rhubarb (*Rheum officinale*).

and it is said to be treated of in a Chinese herbal written about 2700 B. C. European naturalists early endeavored to ascertain the exact species that produced the excellent kinds of rhubarb procured through Russia and Turkey, and distinguished by the name of either one of these countries. Several species of *rheum* have from time to time been regarded as furnishing the better sorts; it is probably produced by different species, one of which is *R. officinale*; this is much larger than the garden rhubarb, differing among other characters in having nearly cylindrical petioles, and the under side of the leaf being covered with short, erect hairs. Formerly the best variety was known as Turkey rhubarb, being brought by caravans from Tartary by way of Persia to the Levant ports, whence it reached Europe; but rhubarb from this source disappeared from the trade about a quarter of a century ago. A similar article entered commerce by way of Russia, and was known as Russian rhubarb. It was brought to the fron-



Himalayan Rhubarb (*Rheum nobile*).

turesqueness; an isolated plant of the common rhubarb is very effective, but the Nepal rhubarb (*R. Emodi*) is much finer; the leaves

tier town of Kiakhta, where it was rigorously inspected by the agent of the Russian government. Every piece of the root was perforated to the centre in order to prove its soundness, and all the defective pieces were destroyed; those accepted were sent to St. Petersburg. The roots were of irregular shape, and appear to have been sliced on the surface with knives, probably for removing the bark, and marked with the large holes going partly through which were made for inspection. On account of the superior quality of the Russian rhubarb it commanded a high price, and to secure this other varieties were made to imitate it. The opening of various ports in northern China, and the rebellion beginning in 1851, exerted a depressing influence on the trade at Kiakhta, and the Chinese being very willing to avoid the great severity of the Russian inspection, the quantity of rhubarb delivered there became so small that the rhubarb office was abolished in 1863, so that Russian rhubarb has become a thing of the past. Most of the rhubarb that comes to the United States is from China, shipped from Canton. Some of this is very good, though still inferior to the Russian. The roots are more cylindrical and smoother, as if scraped; they are not of so bright a color, and the powder has a reddish brown tinge. Defective pieces are mixed in with the best, and as all are usually powdered together the medicine must be of inferior efficacy. The Chinese sometimes attempt to give it the appearance of the Russian variety by cutting it into angular shapes, and filling up with powdered root, in order to conceal the little holes that have been made through the roots for suspending them on strings to dry. It is believed that both the Russian and Chinese come from the same regions in Chinese Tartary and China proper, but there being in the Chinese market no such stringent regulations about the preparation of the drug, the inferior qualities are sent there. The roots are allowed to grow six years before they are sufficiently mature; and after they are dug the bark is removed and the root cut in pieces for drying, which is done in the sun and by the aid of fire heat. Owing to the risk and expense of land transport, rhubarb was in ancient times considerably more costly than opium. It is now purchased for the European market chiefly at Hankow on the upper Yangtse. From 1866 to 1872 the average exports of rhubarb from Hankow were over 3,000 peculs (1 pecul = 133½ lbs.). The cultivation of rhubarb for its root has been attempted in various European countries, and was at one time carried on by order of the Russian government in southern Siberia; some is produced in Hungary, Moravia, and Silesia; in France the cultivation, which in former years was considerable, has ceased except in the neighborhood of Avignon and in a few other localities. In England the cultivation of rhubarb for commerce commenced about a century ago,

and is still continued, the product being known in our commerce; it was formerly called Crimean rhubarb, and is sometimes fraudulently sold as the Turkey drug; in England it is known as Banbury rhubarb, from the locality of the plantations. The root is simply pared, sliced, and dried in a kiln; though very handsome in appearance, English rhubarb is of very inferior character. The species is mainly the common garden rhubarb (*R. Rhaponticum*). The medicinal qualities of the root are much affected by soil and climate, and those species known to give a valuable drug in their native localities yield in the cooler and moister climate of Europe a much deteriorated product. The rhubarb as imported, while hardly subject to adulteration, varies greatly in quality, unsound and poor being mixed with the good, and the inferior pieces being covered with a yellow powder to conceal the surface. In the powdered state there is, as with other drugs, ample room for adulteration, and a large share of that sold is of inferior quality.—The taste of rhubarb is a bitter astringent, the smell aromatic, though to most persons disagreeable; when chewed it crackles in the teeth from the presence of minute crystals of oxalate of lime, and it imparts a yellow color to the saliva. The best sorts are recognized by the bright yellow color of the powder. Its chemical composition is very complicated, and chemists have failed to discover any peculiar principle in the drug which fully accounts for its purgative properties. Brandes found in 100 parts of Chinese rhubarb 2 of pure rhubarbaric acid, 7·5 of the same impure, 2·5 of gallic acid, 9 of tannin, 3·5 of coloring extractive, 11 of uncrystallizable sugar with tannin, 4 of starch, 14·4 of gummy extractive, 4 of pectic acid, 1·1 of malate and gallate of lime, 11 of oxalate of lime, 1·5 of sulphate of potassa and chloride of potassium, 1 of silica, 0·5 of phosphate of lime and oxide of iron, 25 of lignine, and 2 of water. The analyses of Schlossberger and Döpping are still more elaborate, introducing a variety of new principles, among which the chrysophanic acid, resembling the rhubarbaric acid of Brandes, is the most interesting. It is a beautiful yellow substance, emitting yellow vapors when heated, soluble in alcohol, its alkaline solution of a fine red color, and those with potassa changing by evaporation to a violet and then to blue. It is a purgative, but less powerful than rhubarb itself. Magnificent purples also are obtained from the yellow coloring matter produced by treating rhubarb with nitric acid and then with alkalies; and it has been proposed to apply these, called erythrose, in the arts as a dyestuff. The still more recent examinations of Kubly (1867) do not materially change the aspect of the question.—The medical properties of rhubarb are very peculiar. Its first effects upon the system are cathartic, and to these succeeds an astringent action, checking the excessive operation of the purgative. The medicine is at the same time

tonic and stomachic. As a purgative its action is moderate, and affects rather the muscular fibre than the secretory vessels. Its use is obviously indicated for relaxed conditions of the bowels, when the stomach is enfeebled, and a gentle cathartic is required, as in certain cases of dyspepsia, diarrhœa, dysentery, &c. It is much used in combination with magnesia, calomel, and other cathartics, when greater purgative action is required. This action may be reduced by roasting or long boiling. It is exhibited in powder, sometimes made into pills with soap, also in infusion, sirup, and tincture.

RIAD. See RİYAD.

RIANZARES, Duke of. See MUÑOZ.

RIAZAN, or Riezan. I. A central government of European Russia, bordering on Vladimir, Tambov, Tula, and Moscow; area, 16,249 sq. m.; pop. in 1870, 1,477,433. The most important river is the Oka, which enters it in the north, and is connected with the Don by the Upa and the Ivanov canal. The soil is fertile in the south, but marshy in the north. There are extensive pastures; the principal products are grain, fruits, hops, and tobacco. The inhabitants are nearly all Russians, but there are a few Mordvins and Tartars. There are manufactories of coarse linen and woollen goods and of glass and iron. II. A city, capital of the government, on the Oka, 110 m. S. W. of Moscow, with which it is connected by rail; pop. in 1867, 17,950. It is the seat of a Greek archbishop, and has a theological seminary, a gymnasium, a school for young noblemen, and manufactories of cloth, linen, and iron ware.

RIB. See SKELETON.

RIBAUT, Jean, a French navigator, born in Dieppe, killed in Florida in 1565. When Admiral Coligni had obtained from Charles IX. a patent authorizing him to send an expedition to Florida, two vessels under command of Ribault sailed from Dieppe Feb. 18, 1562, and, leaving the usual track so as not to touch at any of the islands held by the Spaniards, came on April 30 in sight of the coast of Florida. Sailing northward along the coast, Ribault anchored in Port Royal harbor in the present state of South Carolina. A fort was built, probably not far south of the present site of Beaufort, and named Fort Charles in honor of the king of France, and 26 colonists were left to keep possession of the country. Returning home, Ribault found France distracted by a civil war, and no aid could be procured for the new colony, the members of which were soon reduced by violence and starvation, and at last the few survivors set sail for their native country in a crazy bark and were picked up by an English ship. A new expedition under René de Laudonnière sailed in April, 1564, and made a settlement on the river May, now called the St. John's, building a fort which they called Caroline. Affairs were mismanaged, no ground was cultivated, some engaged in depredations upon the Spaniards, and all were on the point

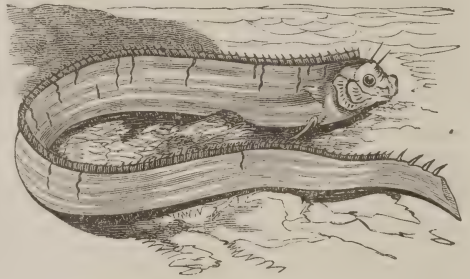
of returning to France when Ribault, who had sailed from Dieppe on May 22, 1565, arrived with a fleet of seven vessels, and superseded Laudonnière in the government of the colony. Scarcely had he anchored when, on Sept. 4, five Spanish vessels under Don Pedro Menendez de Aviles made their appearance. His name and objects were demanded. "I am Menendez of Spain," was the haughty answer, "sent with strict orders from my king to gibbet and behead all the Protestants in these regions. The Frenchman who is a Catholic I will spare; every heretic shall die." The French fleet, unprepared for battle, cut its cables; and the Spaniards after an ineffectual chase entered the harbor of St. Augustine. Against the advice of his officers, especially Laudonnière, Ribault determined to sail for St. Augustine with all the available forces of the colony, and there attack the Spaniards. He had scarcely reached the open sea when a terrible storm arose, by which his squadron was all wrecked on the coast of Florida not far from Cape Canaveral. In the mean time Menendez marched over land, surprised Fort Caroline, and massacred nearly 200 of both sexes. Ignorant of this, Ribault and more than 500 men set out for their fort, travelling through an unknown country. They divided into two parties, the first of which, consisting of 200 men, went in advance of the others, and after coming within a few leagues of St. Augustine surrendered to Menendez at discretion, and were executed. Ribault was with the second party, most of which also fell into the hands of Menendez, who massacred nearly all of them, among them their commander, "not as Frenchmen, but as Lutherans." The French and Spanish accounts differ in some particulars, but agree in the leading facts. In London a volume of 42 pages, now extremely rare, consisting of an English translation of the report of his first voyage made by Ribault to Coligni, was published under the title of "The whole and true Discoverie of Terra Florida (Englished the Florishing Land), conteyning as well the wonderful strange Natures and Maners of the People, with the merveylous Commodities and Treasures of the Country; as also the pleasant Portes and Havens, and Wayes thereunto never found out before the last year, 1562. Written in French, by Captain Ribault, the fyrst that whollye discovered the same, and now newly set forth in Englishe, the xxx. of May, 1563."

RIBBON (formerly spelled riband and riban; Fr. *ruban*), a narrow strip of woven silk, either plain or ornamented. The manufacture of ribbons first attained great importance in the 17th century. About 1680 embossed ribbons were much in fashion, as they are again becoming (1875). They are stamped with hot plates of steel, each piece having a portion of the pattern engraved upon it. Figured ribbons were made chiefly at Paris, but Lyons and Avignon were also largely engaged in the manufacture until after 1723, when the former had secured most

of the trade. Before the revocation of the edict of Nantes (1685) there were about 3,000 ribbon looms in Tours; but that measure, which banished the Protestants, broke up the industry. The city of St. Étienne, the chief town in the department of Loire, is now the principal seat of the ribbon manufacture in the world. The annual consumption of silk there is about 435,000 kilogrammes, and the manufactured product is worth about 65,000,000 francs. Four fifths of all the ribbons in France, and the finest and heaviest in the world, are made here, and about 28,000 workmen and 15,000 looms are employed. Basel in Switzerland is the second place in importance for the manufacture of ribbons, and a large portion of the medium grades imported to the United States come from here. Most of the Basel ribbons are plain or simply striped. In France and Switzerland all ribbons as well as dress silks are made on hand looms, which is the principal reason for the superiority in the French goods. It requires frequent manipulation in silk weaving to preserve a perfect evenness of tension and disposition of the threads, and all power-woven silk fabrics are disposed to "cockle" or crimp in places. Crefeld in Rhenish Prussia is another important place of manufacture, but nearly all its ribbons are black and plain. The ribbon industry is spread through the country, and is divided into small establishments, averaging from 20 to 50 looms each, and power is sometimes employed. In England ribbons are mostly made at Coventry, and with power looms. The warp of the best ribbons is made from the best organzine, thrown from the best Italian and French raw silk. For inferior sorts, silk from China, Japan, and Bengal is used, the last being the poorest. In the fancy ribbon called *chiné* the watered effect is produced by an irregularity in the surface caused by passing two ribbons laid together between two cylinders, one of which is heated.—Galloons, strong thick ribbons, the filling composed of cotton, are mostly made in England on power looms.

RIBBON FISH, the common name of several genera of acanthopterygian fishes of the family *tæniidae*. They are characterized by a compressed, elongated, ensiform body, with very small or no scales; the bones are of loose texture; the eyes large, and teeth small or none. To this ribbon-like body is attached a dorsal commencing close to or upon the head, and completely furnished with membrane; the caudal when present is distinct from the perpendicular fins, and in some is set on at a right angle, like a fan extended upward; the ventrals are often wanting, or are placed beneath the pectorals. They are all marine species.—Among the genera having a protractile mouth with a small aperture belongs *stylephorus* (Shaw), having neither teeth, scales, nor ventrals, and the caudal standing upward, its last ray continuous with the tail and produced into a filament longer than the body. In *trachypterus* (Gouan)

there are a few teeth, thoracic ventrals, a dorsal the whole length of the body, and an erect caudal; the northern ribbon fish or *vaagmeer* (*T. bogmarus*, Val.), from the polar seas, attains a length of 3 or 4 ft., sometimes much more; the skin is covered with a silvery envelope like the shining covering of the choroid of the fish's eye, consisting of minute needle-shaped crystals (see "Annals and Magazine of Natural History," vol. iii., London, 1849); it looks like a silvery ribbon in the water; the lateral line is armed with hooked scales. The *T. falx* (Cuv.) of the Mediterranean has 168 rays on the dorsal and plumes of rays on the head and tail; the color is brilliant silvery, with large, round, black spots.—In the genus *gymnetrus* (Bloch) the ventrals are reduced to a single ray, very long and dilated at the end; the caudal is very small and continuous with the dorsal. Of the eight species, the best known is the ribbon fish of the Mediterranean (*G. gladius*, Val.), attaining a length of 6 or 8 ft.; the rays of the dorsal over the head are elongated and curve backward like a crest; the silvery skin is studded with smooth osseous warts, and the fins are rosy red; like all the rest of the family, it is very easily broken; it lives in still deep waters, and is rarely seen except when thrown ashore after storms in a mutilated



Ribbon Fish (*Gymnetrus Hawkenii*).

condition. The *G. Hawkenii* (Bloch) is occasionally seen on the English coasts, and with its narrow, long, and shining body, and sinuous movements, has been the basis of more than one story of the sea serpent.—In the genera with non-protractile mouth, with large gape and ascending lower jaw, belongs *lophotes* (Giorna); this has on the head a vertical corneous crest sustaining a strong spine, which is the first dorsal ray; the dorsal extends the whole length of the body and has numerous simple rays, the anal and caudal small, and the ventrals near the pectorals. The *L. Cepedianus* (Giorna) of the Mediterranean attains a length of more than 4 ft., and is rarely seen. In *cepola* (Linn.) the body is covered with small scales; there is a single row of teeth in each jaw; the dorsal and anal are very long, and the caudal small. The red ribbon fish (*C. rubescens*, Linn.) occurs from the Mediterranean to the English coasts; it is about 18 in. long,

brilliant red, with indistinct dark bands, and the dorsal saffron yellow bordered with rose.

RIBBON WORMS, the common name of the family *nemertidae*, with the planarians constituting the order *turbellaria*. They are found on the seashore, are worm-like in shape, have a distinct anus, and, in many cases, no external opening to the water-vascular system. The larvæ are generally free-swimming and ciliated, a small portion only producing the adult, the rest being cast away. (See PLANARIANS.)

RIBERA, José. See SPAGNOLETTA.

RICARDO, David, an English political economist, born of Jewish parentage in London, April 19, 1772, died at Gatcomb park, Gloucestershire, Sept. 11, 1823. He received a commercial education in Holland, and was associated with his father in his business of stock broker. He became a Christian, and in 1793 married against his father's wishes. The partnership was dissolved, but the younger Ricardo in a few years realized a fortune. He studied mathematics, chemistry, and mineralogy, and was one of the promoters of the London geological society. In 1819 he was elected to parliament by the Irish borough of Portarlington, which he continued to represent till his death. His first publication was a tract, "The High Price of Bullion a Proof of the Depreciation of Bank Notes" (1809). His principal work is "On the Principles of Political Economy and Taxation" (1817). His works with an account of his life have been collected and edited by J. R. McCulloch (8vo, London, 1846). (See POLITICAL ECONOMY.)

RICAREES. See RICKAREES.

RICASOLI, Bettino, baron, an Italian statesman, born in Florence, March 9, 1809. He became known in 1847 as an advocate of constitutional liberty, and was chosen mayor of Florence. In 1848 he was elected to the Tuscan parliament. He opposed the extreme radicals, and after the disastrous battle of Novara (March 23, 1849) he favored the restoration of the grand duke of Tuscany as a barrier against Austrian invasion; but the reactionary policy of the latter soon drove him from political life. In 1859 he hastened the overthrow of the grand duke, and as a member of the provisional government he brought about the union of Tuscany with Sardinia, and became Victor Emanuel's chief representative and afterward governor general at Florence. On the death of Cavour in June, 1861, he succeeded him as prime minister, with several portfolios, holding the post till March, 1862; and he was again premier in 1866-'7. He was reelected to the Italian parliament in September, 1874, having first entered that body in 1861.

RICAUT, or Ryaute, Sir Paul, an English diplomatist, died in London, Dec. 16, 1700. He graduated at Cambridge, accompanied the earl of Winchelsea to Constantinople, was British consul at Smyrna for 11 years, accompanied the earl of Clarendon in 1685 to Ireland, and was for 10 years minister to the Hanse towns.

He wrote "The Present State of the Ottoman Empire" (1668); "The Present State of the Greek and Armenian Churches" (1679); and "History of the Turkish Empire from 1623 to 1679" (1680), a continuation of Knolle's "General History of the Turks."

RICCI, Federigo, an Italian composer, born in Naples about 1809. He studied with his elder brother Luigi (who died in 1859) at the conservatory of Naples, and jointly with him composed *Crispino e la comare*. He has been director of the operas at Madrid, Lisbon, and St. Petersburg.

RICCIO, Domenico. See BRUSASORCI.

RICCIOLI, Giovanni Battista, an Italian astronomer, born in Ferrara, April 17, 1598, died in Bologna, June 25, 1671. He was a member of the society of Jesus, taught in the Jesuit colleges of Parma and Bologna, and finally devoted himself to astronomy and geography. He undertook, though in a friendly spirit, to refute Copernicus in the *Almagestum Novum* (2 vols. fol., Bologna, 1651). His *Astronomia Reformata* (2 vols., 1665) is a completion of the former work. Mädler says that Riccioli's work "would have been forgotten had he not been led by vanity to find a place for his own name on the moon, an arrangement which he only achieved by displacing all the names used by Hevelius, at the risk of causing perplexity and confusion to later astronomers." He also published *Geographiæ et Hydrographiæ Reformatae Libri XII.* (fol., 1661) and *Chronologia Reformata* (1669).

RICE (Gr. *ὄρυζα*, Lat. *oryza*, Fr. *riz*), one of the cereal grains, *oryza sativa*, of the grass family. The genus is the type of a small tribe of *gramineæ*, the *oryzææ*, in which the one-flowered spikelets have the glumes very



Rice (*Oryza sativa*), bearded and beardless varieties. Separate Spikelet enlarged.

much reduced, or wanting altogether, and the palea, which in most grasses are more delicate, are in these firm and prominently nerved. In rice itself, an annual 2 to 4 ft. high, the lance-

linear leaves are rough on the upper surface; the flowers are in panicles with somewhat erect branches; the one-flowered spikelets have very minute glumes, not one fourth as long as the palea, which are much flattened laterally, the upper strongly three- and the lower five-nerved and pointed or bearing an awn; the palea grow with the grain, and completely invest it when ripe; stamens six. Rice has been cultivated from the earliest times in India, and the Chinese records state that it was introduced into that country in 2822 B. C.; it is found growing spontaneously in various parts of India, but chiefly on the banks of rivers, where it may have been carried from cultivation, and there is much doubt as to the place of its origin. In the wild state and in cultivation there are numerous varieties, differing in the size, shape, and color of the grain; in India a wild variety found on the borders of certain lakes is preferred by the rich Hindoos to all others, but as its yield is very small it is not cultivated. The improvement of rice by selection has long been practised by the Chinese; an early imperial edict enjoined the selection of the largest seed for sowing; the most valued kind cultivated in this country was obtained by a planter in South Carolina, who, noticing some remarkably long grains upon a head, selected these, and thus obtained the variety known as the long grain; in Ceylon 161 varieties are enumerated. Ordinary rice requires irrigation for its successful culture, but in the mountainous parts of India, in northern China, and in Japan, an upland variety (or species?) is in common cultivation, which is only 3 ft. high and is grown like ordinary grain. Rice is in some parts of India the chief article of produce, and in some districts, particularly in the marshy lands along the coast of Orissa, it is almost the only object of agricultural labor. In China and the islands of the eastern archipelago it is the principal support of the vast population of that portion of the globe. It is extensively cultivated in parts of Africa, in southern Europe, and in the tropical countries of North and South America. Various accounts are given of its introduction into this country. Gov. Alston of South Carolina in an agricultural address (1854) says: "Rice, for which we are indebted to the island of Madagascar, was introduced into Carolina and America at once, toward the close of the 17th century." One account states that a vessel from Madagascar "put into Carolina" and left some seed there. Gov. Alston gives no particulars, but says that a few grains of this Madagascar rice were sown in a garden, which is now one of the thickly built parts of Charleston, and that from this came the seed which has made South Carolina the great rice-growing state. Another account says that rice was grown in Virginia by Sir William Berkeley as early as 1647, but gives no particulars. There are three principal varieties in the rice-growing states: 1. White rice, valued for its earliness and for growing upon uplands; the husk

is cream-colored; an ounce contains 960 grains. 2. The gold-seeded, which has a deep yellow husk and a large, fine, white grain; an ounce contains 896 grains. 3. The long-grain, a sub-variety of the gold-seeded, obtained as already described; it has 840 grains in the ounce; the grains are longer than any other, and it is the most valued for exportation. For home use a long-awned variety called the white-bearded is often sown.—The best lands for the cultivation of rice are on the banks of rivers having a deep soil, chiefly of decomposed vegetable matters, and so situated as to be overflowed by the opening of tide gates. They must be above the salt or brackish water, and below the reach of the freshets, so as not to be flooded at unseasonable times. Other low lands not in the tide region may bear good crops if so situated that they can be drained and flooded at will. The land is prepared by a thorough system of embankments and ditches, so laid out as to form independent fields, the size of which is limited by the number of hands that can finish any one operation connected with the culture in one day; they usually consist of from 14 to 20 acres. The ditches are of various dimensions, often 5 ft. wide and as many deep, and sometimes the principal one is large enough to be used as a canal for transportation between the fields and the barns. Early in the winter the land is either ploughed or dug over with the hoe, and in the warm changes of the weather it is covered with water. In March it is kept dry, the drains are cleansed, the clods broken, and the surface smoothed off with the harrow or hoe, and trenches for the seed are made with a 4-inch trenching hoe at right angles with the drains 12 to 15 in. apart. In April and till the middle of May the seed is scattered in these trenches at the rate of $2\frac{1}{2}$ to 3 bushels to the acre. Great attention is given to selecting the seed; and sometimes the rice for this purpose is threshed by hand over a log or barrel, so as to throw out only the full-sized grains. "Volunteer" rice, the product of scattered seeds that have remained in the ground from the crop of the preceding year, is treated as a weed, and all that appears outside of the drills is cut up with the hoe. As the seed is sown it is covered lightly with soil, and the water is then let in through the gates and kept upon the land for four to six days, till the grain swells and begins to sprout. If the seed is not to be covered in the drills, it is previously prepared by stirring it in clayey water, and being then dried enough clay adheres to insure its remaining in the trenches when the water is let on. With the first method the water has to be let on a second time when the plants sprout and appear like needles above the ground, while with the latter one flooding answers. The water, after standing four to six days on the sprouts, is drained off, and when the plant is five or six weeks old the earth is stirred with the hoe; this is repeated ten days afterward, and the "long

water" is then put on for about two weeks, deep for four days, and then gradually diminishing. After the water has been drawn off about eight days and the field is dry, it is hoed to a good depth. On the appearance of a joint in the plant the land is lightly hoed again, and is then "laid by," that is, the "joint water" is put on to remain until the grain is matured, which may be two months. A few days before cutting, the water is run off and the ditches are washed out by the succeeding tide. The rice is cut with a sickle, and is carefully laid across the high and thick stubble to cure. The day after cutting, when the dew is off, it is bound in sheaves, and either borne on the heads of the laborers or packed in large flats, each one carrying the product of five to seven acres, to be conveyed to the barn yard. It is there stacked in small ricks, and when thoroughly cured it is put away in large stacks, each of which holds enough to make 200 to 400 bushels of threshed grain. The threshing is done with a machine invented by Calvin Emmons of New York, which is generally in use; this separates the grain by the action of toothed beaters revolving at the rate of 750 to 800 turns per minute. The grain comes from the threshing mills as rough rice or paddy, which requires milling or grinding to free it from the hulls; but it is often shipped in this state, in which it is well protected against damage, to be hulled in Europe or in New York, the rice being delivered fresh and clean to the consumers. The old method of removing the hulls was by pounding in hand mortars made of pitch pine blocks and holding about a bushel; it is at present hulled by steam power; an elevator takes the grain to the top of the building, where a screen frees it from sand; it then passes between a pair of heavy stones 5 ft. across, which remove the outer husk; thence it goes into large wooden mortars, the iron-shod pestles to which weigh 250 to 350 lbs. each, and is pounded for about two hours, when it is ready for screening. There are some mills which clean the rice by means of wire cards, without pounding. Finally the rice is passed through an inclined revolving cylindrical wire screen, the gratings of which grow coarser toward the lower end. It is thus assorted into a number of products. At the upper end of the screen the flour passes through, next the eyes and small pieces of broken rice, then the "middling rice," which consists of larger fragments and of the smaller grains, and lastly the "prime rice," or best and mostly unbroken grains. The head rice or largest grains of all, together with the rough that escaped the mill, pass out at the lower end and are thence returned to the mill. The prime rice as it falls through the screen descends to the "polishing" or "brushing screen," which is a vertical cylinder, laid up and down with shreds of sheepskin, and made to revolve rapidly within a wire screen. The rice, falling down in the space between these, is swept clean of the flour that adheres to it,

and is discharged below in a perfectly clean and polished condition. It is received in barrels holding about 6 cwt. each, and is then ready for the market. The middling and small rice, being cleaned by a fan, are kept for home consumption.—The average of several analyses gives as the proximate composition of rice: albuminoids 7.5, carbo-hydrates 76.5, water 14.6, ash 0.5. It will be seen that, as compared with wheat, rice is deficient in albuminoids, or flesh-forming principles; it is a very easily digestible food, and especially adapted to use in warm climates. New rice is said to produce indigestion and diarrhoea, and it should not be used until six months old. It is said that in some parts of India it is regarded as fit for food only when it has been kept three years. Some southern physicians assert that a diet consisting largely of rice produces near-sightedness, and that there are ten times as many persons with disordered eyes in the rice-consuming districts as elsewhere. The common method of cooking rice is to boil it in water properly salted, the rice being introduced into the water after this is boiling hot. In four or five minutes the water is drained off, and the pot covered is left 20 minutes longer on the coals. The rice is then ready to be served up as a vegetable, in which state the grains should be thoroughly cooked, but still retain their identity. In tropical countries it is much eaten in curries, which consist of rice, meat, and various aromatics. It is also made into puddings, as is the ground rice or rice flour, of which are made varieties of bread and of griddle cakes. Parched rice is one of the many substitutes for coffee. Rice flour or rice starch is found in the stores put up in packages as *rizena* and under other trade names. In medical practice a decoction known as rice water is often prescribed as a nutritive drink in fevers and inflammatory affections of the bowels, lungs, and kidneys. Its decoction fermented and distilled produces the spirituous liquor known as *arrack*. A useful cement is readily prepared from rice by mixing the flour with cold water and boiling. It dries nearly transparent, and is used in making many articles in paper. If made with little water, it may be moulded into models, busts, &c. Although so rich in starch, it has not been found an economical material for supplying that article.—The total production of rice in the United States in 1870, according to the federal census, was 73,635,021 lbs., of which South Carolina produced 32,304,825 lbs., Georgia 22,277,380, Louisiana 15,854,012, North Carolina 2,059,281, Florida 401,687, Mississippi 374,627, Alabama 222,945, Arkansas 73,021, Texas 63,844, and Tennessee 3,399. There has been a marked decrease in the production since the civil war; the total yield in 1850 was 215,313,497 lbs., and in 1860 187,167,032. A small quantity is annually exported from the United States, amounting during the year ending June 30, 1874, to 558,922 lbs., valued at \$27,075. The imports during

the same year amounted to 73,257,716 lbs., valued at \$2,083,248; 38,716,980 lbs. were imported from England, 29,218,123 from China, 2,443,601 from the British East Indies, and 1,087,785 from the Hawaiian Islands.

RICE. I. A S. E. county of Minnesota, drained by the head waters of Cannon river; area, about 575 sq. m.; pop. in 1870, 16,025. The surface is uneven; the soil is productive. It is intersected by the Milwaukee and St. Paul railroad. The chief productions in 1870 were 531,206 bushels of wheat, 227,931 of Indian corn, 348,543 of oats, 36,773 of barley, 57,862 of potatoes, 33,615 tons of hay, 20,607 lbs. of wool, and 364,260 of butter. There were 3,775 horses, 4,240 milch cows, 7,603 other cattle, 7,907 sheep, and 7,324 swine; 1 manufactory of agricultural implements, 3 of carriages and wagons, 6 of cooperage, 4 of furniture, 4 of saddlery and harness, 6 of tin, copper, and sheet-iron ware, 8 flour mills, 9 saw mills, and 1 distillery. Capital, Faribault. **II.** A central county of Kansas, intersected by the Arkansas river, and watered by Low creek and the Little Arkansas; area, 900 sq. m.; pop. in 1870, 5. It is traversed by the Atchison, Topeka, and Santa Fé railroad. The surface consists of undulating prairies, which have a fertile soil. The bottom lands are well timbered. Capital, Brookdale.

RICE, Indian, also called water rice, Minnesota rice, and water oats (*zizania aquatica*, the generic name being the ancient Greek one for some wild grain), an annual aquatic grass, with stems from 3 to 10 ft. high, growing in the swampy margins of streams, where it frequently forms the sole vegetation of extensive tracts. The genus belongs to the same tribe

ers, which have six stamens, and fall soon after shedding their pollen; the upper branches, with the pistillate flowers, are erect; the pedicels to the flowers club-shaped; glumes rudimentary; lower palet long-awned; the grain slender, cylindrical, about half an inch long, and purplish. The seeds of this plant afford abundant food for birds, especially water fowl; they are a favorite food of the reed bird, and when the grain is ripe the birds are shot in great numbers, especially along the Delaware river. The grain was formerly an important article of food with the Indians of the northwest, who collected their winter supplies by pushing their canoes through the thickets, and shaking off the grain, which falls when ripe with the slightest touch into the canoes. Every few years there has been an attempt to bring this plant into notice as a valuable cereal; but were there no other obstacle to its cultivation, the remarkable readiness with which the grain drops would prevent its coming into use. As a food the grain, according to Dr. Bachman, ranks with oats, an estimate which probably refers to the taste rather than to nutritious qualities. Recently the plant has been mentioned in English journals as a highly valuable paper stock, and some very coarse paper has been made from it; if the experiment should prove successful, the supply in our northwestern states and in Canada would be found practically inexhaustible.—Another species, *Z. miliacea*, is common southward; it differs from the foregoing in being a perennial, is somewhat smaller, and has the staminate and pistillate flowers intermixed, and not on separate branches of the panicle; the grain is ovate.

RICE, Luther, an American clergyman, born in Northborough, Mass., March 25, 1783, died in Edgefield district, S. C., Sept. 25, 1836. He graduated at Williams college in 1810, and after studying at Andover theological seminary sailed in 1812 for India as a missionary under the American board. On the voyage Mr. Rice, like his friend the Rev. Adoniram Judson, changed his views, accepting those of the Baptists. He consequently returned, and spent several years in organizing missionary societies and raising funds among that body. He also projected the establishment of the Columbian college at Washington, D. C., and was for many years its financial manager.

RICE BIRD, or Java Sparrow. See FINCH, vol. vii., p. 190.

RICE BUNTING. See BOBOLINK.

RICE PAPER TREE. Beautifully executed paintings of flowers and insects upon a delicate semi-transparent material, and the material itself, were brought from China in the early days of commerce with that country; for the want of a better name it was called rice paper, but the microscope showed that rice did not enter into its composition, and that it was some kind of pith. Various plants, among others the breadfruit, were suggested as the source of this material, but it was not until



Indian Rice (*Zizania aquatica*). Panicle, and a separate Pistillate and Staminate Flower.

with rice, but differs in having separated flowers, the staminate and pistillate being upon the same plant; the lower branches of the ample panicle are spreading, and bear staminate flow-

1852 that its history was made out; in that year Sir William Hooker in the "Journal of Botany" gave an account of the rice paper plant, which he referred to the genus *aralia*



Rice Paper Tree (*Fatsia papyrifera*).

and called *A. papyrifera*. In a revision of *aralia* and related plants Decaisne and Planchon in 1854, for botanical reasons, separated this from *aralia*, and made a new genus, *Fatsia*; and though the plant will be found in most current botanical and horticultural works as *aralia papyrifera*, its proper botanical name is *Fatsia papyrifera*. The tree is a native of Formosa, rarely growing more than 20 ft. high, and branching above; the young stems, leaves, and inflorescence are covered with a copious down of stellate hairs; the leaves, on long petioles, are often a foot across, round-heart-shaped, and five- to seven-lobed. The flowers are small and greenish, and are produced in pendulous panicles, 1 to 3 ft. long at the end of the branches. The plant has such ample leaves and so stately an aspect that it is a favorite in subtropical planting; a single young and vigorous specimen as a centre to a bed of low-growing plants produces a fine effect. It must be kept in a greenhouse or dry cellar during winter, though if left out the roots would no doubt prove hardy, as the writer had numerous young plants come up in the spring from fragments of the roots left in the soil on taking up a large plant the previous autumn. The vigorous stems have a pith which is an inch and a half in diameter and of a snowy whiteness; after the woody exterior is removed, the Chinese cut the pith into sheets, by paring with a sharp knife from the circumference toward the centre, unrolling it, as it were, and then flattening it out and pressing it under weights until dry, when it remains as a flat sheet. It is imported in sheets a few inches

square, and in dry weather it is exceedingly fragile. It is used solely for fancy ornamental work; some of the pith is exported in the stem for artificial flower makers, who find in its tissue a material which more closely than any other imitates the petals of the most delicate flowers.

RICH, a N. E. county of Utah, bordering on Idaho and Wyoming, and intersected by Bear river; area, about 850 sq. m.; pop. in 1870, 1,955. The E. part is mountainous. It is generally well timbered, and adapted to the raising of grain, stock, and vegetables. The chief productions in 1870 were 3,782 bushels of wheat, 6,175 of oats, 2,530 of barley, 4,660 of potatoes, and 775 tons of hay. The value of live stock was \$26,015. Capital, St. Charles.

RICH, **Claudius James**, an English traveller, born near Dijon, France, March 28, 1787, died in Shiraz, Persia, Oct. 5, 1821. When 15 years old he was familiar with Arabic, Hebrew, Syriac, Persian, and Turkish. In 1803 he became a cadet of the East India company, and in 1804 a writer at Bombay. He was appointed secretary to Mr. Lock, consul general to Egypt, and after perfectly acquiring the Turkish and Arabic languages, travelled over a great part of Palestine and Syria as a Mameluke, and finally reached Bassorah, whence he sailed to Bombay. In 1808 he was appointed by the East India company resident at Bagdad, where he remained about six years. In 1811 he visited the site of Babylon, and published a "Memoir on the Ruins of Babylon." After a second journey to that place, he published a "Second Memoir on Babylon" (1818). In 1820 he travelled in Kurdistan, going as far east as Sinna. His widow published his "Narrative of a Residence in Kurdistan" (1839). His collections are in the British museum.

RICH, **Edmund, Saint** (called by the French *Saint Edme*), archbishop of Canterbury, born in Abingdon, Berkshire, about 1190, died at Soissy, France, Nov. 16, 1242. He studied at Oxford, graduated in theology at the university of Paris, and lectured for some time there on Scripture. From 1219 to 1226 he taught philosophy at Oxford, being the first there to expound the logic of Aristotle. He accepted a prebend in the cathedral of Salisbury, but gave nearly all the revenues to the poor; and on April 2, 1234, he was consecrated archbishop of Canterbury. The king permitted him to enforce discipline in spite of the opposition of his clergy, his chapter, and even his own relatives. Pope Gregory IX. sent him a bull empowering him to appoint to all vacant benefices not filled within six months after the decease of the former occupant; but the king persuaded the pope to revoke the bull, and the pope then appointed Italians to the vacancies. Edmund, deeming this an abuse of the papal power, about 1239 retired to the Cistercian abbey of Pontigny in France. On account of enfeebled health he went to Soissy in Champagne, where he died. His remains were taken

back to Pontigny. He was canonized by Innocent IV. in 1246. (See PILGRIMAGE, and PONTIGNY.) Among his works are: "Constitutions" in 36 canons, extant in, among other collections, Labbe's editions of the councils; *Speculum Ecclesiæ*, published in vol. iii. of the *Bibliotheca Patrum*; and several manuscript treatises on moral subjects, preserved in the Bodleian library. A manuscript life of St. Edmund, by his brother Robert, is preserved in the Cottonian collection; another by Bertrand, his secretary and companion in exile and afterward prior of Pontigny, was published in Martenne's *Thesaurus Anecdotorum*.

RICHARD I., surnamed CŒUR DE LION (the lion-hearted), second king of England of the line of Plantagenet, born in Oxford, Sept. 13, 1157, died near Limoges, France, April 6, 1199. He was the second son of Henry II. and Eleanor of Aquitaine, and great-grandson in the female line of Henry I. He became celebrated for his proficiency in arms and his fondness for music and poetry. He engaged with his brothers Henry and Geoffrey in a revolt against Henry II. before he had completed his 16th year, and fled to France, where he was knighted by Louis VII. Claiming Aquitaine and Poitou, he was compelled to give way before his father, to whom he surrendered, and by whom he was forgiven. He was then known as the count of Poitou, but claimed to be duke of Aquitaine, and having distinguished himself in the war against the rebels there, the duchy was ceded to him by his father. The last rebellion in Aquitaine was aided by Richard's brother Henry, whose death brought it to an end, and made Richard heir apparent. The king then desired that Richard should give up Aquitaine to his brother John, which he refused to do, and by their father's orders John and Geoffrey ravaged his territories, which Richard punished by invading Brittany, of which Geoffrey was ruler. Richard subsequently surrendered Aquitaine to his mother, but it was shortly after restored to him, and by his father's orders he entered upon a successful war with the count of Toulouse. After a violent but brief rupture with his father, caused by his intimacy with Philip Augustus, Richard took the cross in the third crusade; but in spite of his vow he had to renew the war with the count of Toulouse. He also took part in the next contest between Henry and Philip; but a report prevailing that his father intended to exclude him from the succession, and confer the crown upon Prince John, Richard did homage to Philip for his English territories in France. In the war that followed, Philip and Richard were victorious, and dictated terms to Henry, who soon after died of mortification, July 6, 1189, cursing his sons. Richard was present at his burial, and was greatly affected. He was crowned at Westminster, Sept. 3. The people having risen against the Jews on the occasion of his coronation, he protected them. In the sum-

mer of 1190 the French and English armies destined for the crusade, under their respective kings, met on the plains of Vezelay, on the borders of Burgundy, 100,000 strong, and in September arrived in Sicily, where they passed the autumn and winter. This led to much trouble, Richard becoming involved in quarrels with the king of Sicily and his subjects, in which the French favored the latter. While they were at Messina a treaty was made which set Richard free from his betrothal to Philip's sister Alice, and enabled him to arrange for his marriage with Berengaria, daughter of Sancho, king of Navarre, who arrived in Sicily in company with his mother. Leaving Messina in April, 1191, his fleet encountered rough weather; some of his ships were wrecked on the coast of Cyprus, and their crews were inhospitably treated by the ruler of that island, Isaac Comnenus, who endeavored to get possession of the persons of Berengaria and of Richard's sister Joan, dowager queen of Sicily. Richard conquered the island in a fortnight, and made Isaac a perpetual prisoner. While at Cyprus he married Berengaria. On June 4 he sailed for Acre, capturing a Saracenic ship on his way. He found the French king at Acre, and that rivalry which defeated the object of the crusaders soon broke out, Philip favoring the faction of Conrad of Montferrat, while Richard supported Guy of Lusignan. Philip wished to assault Acre immediately, to which Richard objected, as all his troops had not arrived, and he was himself suffering from the pestilence that was raging in the Christian host. Philip made the attack, and was beaten. During his illness Richard is said to have received many courtesies from their enemy, Sultan Saladin. He slowly recovered, and the siege was prosecuted, every attempt of Saladin to relieve the place failing. Acre was surrendered on July 12, and soon afterward Philip sailed for France. On Aug. 20 Richard caused his Saracen prisoners to be butchered, because the terms of the surrender of Acre had not been fulfilled; and the next day he began his march toward Jerusalem, suffering much from the active operations of the light troops of Saladin. He completely defeated the Saracens at Arsuf Sept. 7, and took Jaffa; and after much opposition from his associates, he proceeded with a portion of the crusading force to Ascalon, which he reached in January, 1192, and where he was joined by most of the French troops. He rebuilt the walls, and hoped to invest Jerusalem; but the renewed dissensions of the Christians marred his plans. The news from England, too, required that he should return home. Still he adhered to the purpose of the crusade, and made arrangements to proceed to Jerusalem, but Saladin had so fortified that city that it was considered impregnable. Richard returned to Acre in July, and was about to embark for England, when he heard that Jaffa was in danger of falling into the hands of the Sara-

cens. Hastening to its relief, at the head of a small force, he defeated Saladin, and afterward defended the place against an attack by the Mohammedans. A truce soon followed, and Richard left Acre in October. He was shipwrecked at the head of the Adriatic, and while seeking to continue his journey by land became the prisoner of Leopold, duke of Austria, whom he had insulted and struck in Palestine. Surrendered by Leopold to the emperor Henry VI., he was held in confinement at various places, but was finally released for a ransom, notwithstanding the efforts of his brother John and the French king for his detention, and reached England March 13, 1194. The greater part of the latter years of his reign was passed in France, where he carried on almost constant warfare with Philip Augustus, in which he won brilliant successes, that do not seem to have produced any permanent effect. In 1199 he laid siege to the castle of Chalus, to compel the viscount of Limoges to surrender a treasure that had been found in one of his fields, which Richard claimed as sovereign lord of the soil. Here he received a wound from which, as it was unskillfully treated, he died. He left no legitimate children, and his wife Berengaria, who survived him many years, never visited England. Besides his reputation for soldierly valor and strength, he was renowned in his own day for wit, eloquence, and song, ranking as one of the best troubadours. Some of his poems in Romance have been preserved.

RICHARD II., eighth king of England of the house of Plantagenet, born in Bordeaux in 1366, supposed to have been murdered at Pontefract castle in February, 1400. He was the second and only surviving child of Edward the Black Prince, eldest son of Edward III., by Joan, sister of the last earl of Kent. The prince dying June 8, 1376, Richard became heir apparent, and succeeded to the crown, June 21, 1377. His coronation took place July 16. A council was appointed to conduct the business of government, from which the king's unpopular uncles were formally excluded, but its members were in part under their influence. The war between England and France was continued, to the disadvantage of England. Scotland was hostile; and the ambition of Richard's uncles, the duke of Lancaster (John of Gaunt) and the earl of Cambridge (afterward duke of York), who by right of their wives expected to obtain possession of Spain, was the cause of trouble between England and the peninsula. It was found necessary to lay new and heavy taxes, which were rigorously collected. The first poll tax, which bore upon persons in good circumstances, was submitted to; but when the tax was extended to persons of every condition, three groats being levied on each male and female above the age of 15 years, the returns were small. This was attributed to negligent collection, and a commission was

appointed to enforce the tax. Its proceedings were odious, and resistance was made in Essex and Kent. At Dartford, in Kent, one Walter the Tiler, having struck dead a tax gatherer who had insulted his daughter, was made chief of the insurgents, and hence the popular rising is known as Wat Tyler's rebellion. The insurrection spread over nine counties, and partook of the character of the Jacquerie that had occurred in France 23 years before. The insurgents marched upon London, and assembled to the number of 100,000 on Blackheath, June 12, 1381. The city was entered, the tower seized, and the archbishop of Canterbury, the treasurer, and several other persons of eminence, were put to death. There was some plundering, and the palace of the duke of Lancaster was destroyed. The early demands made upon the king were deemed reasonable, such as the abolition of slavery, the commutation of the dues of villenage, free trade in the market towns, &c.; and Richard promised that they should all be complied with, whereupon many of the people returned to their homes. Tyler now became insolent, and made further demands upon the king, compliance with which was impossible; and in an interview with Richard he behaved so arrogantly that he was slain by Sir William Walworth, lord mayor of London. The king, who was in his 16th year, immediately placed himself at the head of the rebels, thereby saving his own life and the lives of his attendants. They accepted him, and he led them into the country, and allowed them to depart without molestation. The promises made to the people were not kept, and they were punished with merciless severity. Richard married Anne of Bohemia, eldest daughter of Charles IV., emperor of Germany. An invasion of Scotland was made in 1385, the king heading a large army, which accomplished little. Lancaster being absent in Spain, the duke of Gloucester, another of the king's uncles, made himself master of the kingdom, but Richard was induced by his favorite, the earl of Oxford, to attempt to throw off the yoke. In the ensuing contest Gloucester triumphed, and was placed at the head of a council of regency in 1386, which held sovereign power. In 1387 the king, who was aided by the judges, sought to recover his power, but Gloucester defeated his soldiers, and slaughtered or banished his immediate supporters. Two years later Richard was more successful, and changed his ministers, Gloucester himself being removed. The French war languished, and that with Scotland was remarkable only for the battle of Otterburn, in which the Scotch were victorious. A truce for 25 years was concluded with France, and, Queen Anne having died in 1394, it was provided that Richard should marry Isabella, daughter of Charles VI., in 1396, though the princess was a mere child. Gloucester endeavored to recover his former power, but failed, the king being supported by parliament, and

crushing his enemies, some of the most prominent of whom were banished or put to death. Richard banished Henry of Bolingbroke, duke of Hereford, son of the duke of Lancaster, in 1398, for ten years; and on the death of Lancaster he made the term of banishment perpetual, and seized the estates of the exile. Richard had now become very unpopular, and in July, 1399, Henry, now duke of Lancaster, during the king's absence in Ireland, landed at Ravenspur, accompanied by a few eminent Englishmen. He was joined by several powerful nobles and great numbers of people of all degrees. Richard returned, but was seized and imprisoned, and deposed by parliament, after a renunciation of the crown had been obtained from him. Lancaster was called to the throne, and became king as Henry IV. Parliament thus set aside the legitimate heir to the throne, Roger Mortimer, earl of March (grandson of Lionel, duke of Clarence, third son of Edward III.), upon whom an earlier parliament had settled the crown, in accordance with the received laws of inheritance. Richard was imprisoned in Pontefract castle, and it is supposed that he was there murdered by his keeper, Sir Piers Exton. A corpse, purporting to be that of the ex-king, was exhibited in London for two days, and was buried in Westminster abbey; but the tomb having been accidentally opened long afterward, no marks of violence were found on the skull. One story was that he was starved to death. It has been plausibly maintained that he escaped from Pontefract and fled to the Western islands, was there recognized, and carried to the Scotch court, where he died in 1419, and was buried at Stirling. Richard was a weak prince, and owed his fall to his fondness for favorites, to the vehemence of his despotism in the latter part of his reign, and to the wantonness of his expenditures, which England was then ill able to bear. He was fond of literature, like most of the Plantagenets, and appreciated and enjoyed the works of Chaucer, Gower, and Froissart. In the 16th year of his reign (1393) the statute of *præmunire* was enacted.

RICHARD III., last king of England of the Plantagenet line, born at Fotheringay castle, Oct. 2, 1452, killed at the battle of Bosworth field, Aug. 22, 1485. He was the eleventh child and eighth son of Richard, duke of York, and of his wife Cecily Neville, daughter of the earl of Westmoreland. The duke of York was descended in the female line from Lionel, duke of Clarence, third son of Edward III., and the English throne was held by Henry VI., great-grandson of John of Gaunt, duke of Lancaster, Edward III.'s fourth son. York became the chief of that party which sought to set aside the line of Lancaster, but was defeated and captured at Wakefield at the close of 1460, and was immediately executed. His son Richard was a prisoner at the age of eight. On his father's death Richard was sent by his mother to Utrecht. When his eldest brother

became king of England, in 1461, as Edward IV., Richard was brought home and made duke of Gloucester, and afterward lord high admiral and chief constable of England for life, and chief justice of South Wales. In 1470, during the rebellion of the earl of Warwick and the duke of Clarence (the king's brother George), the duke of Gloucester was appointed commissioner of array in Gloucestershire, Devonshire, and Cornwall, and in the same year warden of the northern marches. In September he accompanied the king when he fled to Flanders because of the triumph of Warwick at the head of the Lancastrian party, and he was attainted and outlawed by parliament. When Edward returned Gloucester was in his train, and had the principal part in effecting that reconciliation between the king and Clarence which restored the throne to the house of York. At the battle of Barnet, April 14, 1471, Gloucester commanded the van of the Yorkist army, being in immediate opposition to Warwick, and by his conduct proved himself a skilful leader and a brave soldier, and contributed to the victory. The same post was assigned to him at the battle of Tewkesbury, 20 days later. In reward for his services, the king created him lord high chamberlain of England for life, and endowed him with a large number of manors and lordships that had belonged to the Nevilles, and several forfeited estates. He sought and found the lady Anne Neville, Warwick's youngest daughter, who had been betrothed to Prince Edward of Lancaster and concealed by her relatives, and married her about the month of March, 1472. He was a second time appointed lord high constable of England, and shortly afterward "keeper of all the king's forests beyond the Trent for life," and justiciary of North Wales, and took up his official residence at Pontefract castle, as chief seneschal of the duchy of Lancaster. Gloucester exerted his influence with the king to mitigate the horrors of the contests of those times, and especially in behalf of the Nevilles. In 1475 he accompanied Edward IV. in his invasion of France, and was the only Englishman of note in the army who was neither corrupted nor cajoled by Louis XI. On the execution of his brother Clarence, with which he had no connection, he received his possession of Barnard castle in Durham and his office of chamberlain; and he was constituted admiral of England, Ireland, and Aquitaine, and "one of the triers of petitions" in the parliament that met in 1478. War breaking out between England and Scotland, Gloucester was created lieutenant general of the kingdom, and in the summer of 1482 he took possession of Berwick, and penetrated to Edinburgh, at the head of a large army, and compelled the Scotch to accede to the terms of peace he proposed. One of the king's last acts was to bestow upon his brother the wardenship of the west marches of England, the lordship of Carlisle with everything

connected therewith, and a large sum of money. Edward IV. died April 9, 1483, and Richard, who was then in the north, prepared to go to London, and took the oath of allegiance to his nephew, Edward V., and compelled all who were under him also to take it. Hastening south, he seized the young king's person, and escorted him to the capital, having imprisoned Lords Rivers and Grey, and some other persons of the queen mother's party. Gloucester was appointed "protector and defender of the realm" by the council of state, which act parliament confirmed. He now resolved to make himself king, as the only alternative to becoming a victim of the queen mother's party. His proceedings are involved in much obscurity, but on June 13 Lord Hastings, the lord chamberlain, was suddenly seized at the tower by Gloucester's order and put to death, without even the form of a trial, on the charge of being concerned in a conspiracy against the protector and for the seizure of the government. Hastings, to whom Gloucester was attached, was probably murdered because the latter knew that he would never be false to Edward V. The children of Edward IV. were declared illegitimate, because their father had entered into a contract with Lady Elinor Butler before he married Elizabeth Grey. The young king was set aside by the estates of the realm, by whom Gloucester was requested to ascend the vacant throne. He complied, and became king June 26, 1483, with the style and title of Richard III. No opposition was made to him, and his coronation took place July 6. But the people soon began to murmur because of the fate of the young princes. (See EDWARD V.) The duke of Buckingham, who had been the chief agent in Richard's elevation to the throne, entered into a conspiracy for his overthrow. The earl of Richmond, who was regarded as the head of the Lancastrian party, was to be made king, on condition that he espoused Elizabeth, eldest daughter of Edward IV. This conspiracy failed, and Buckingham was executed. The queen dowager was prevailed upon to leave sanctuary, in which she had taken refuge, and to place herself and family in Richard's hands. The parliament of 1484 confirmed the king's title, and settled the crown on his son Edward, prince of Wales; but that prince died immediately after. Edward, earl of Warwick, son of the late duke of Clarence, was then named heir to the crown, but was soon set aside, and the earl of Lincoln, eldest son of the king's eldest living sister, the duchess of Suffolk, was substituted for him. Richard had now become very unpopular, because of the forced loans he had made, though his general legislation was good. The earl of Richmond, after several failures, resolved to make another attempt to gain the English crown. Assisted by the French government and by the duke of Brittany, he landed at Milford Haven Aug. 7, 1485. Richard had assembled a large army, and would have

easily crushed his rival but for the infidelity of some of his nobles. The two armies met on Bosworth field, Aug. 22, and Lord Stanley went over to Richmond in the heat of the battle, while the earl of Northumberland, who commanded the second line of the royal army, stood aloof. Even then the king might have retrieved his fortune but for the conduct of Sir William Stanley, who had remained neutral until Richard had hewn his way to where Richmond stood, when he joined the Lancastrians at the head of 3,000 men. This decided the result of the battle. Richard fell fighting bravely, declaring that he would die king of England. His body was basely treated by the victors, and was begged and buried by the nuns of Leicester in their chapel. Richard III. was the last of the Plantagenets, whose dynasty was succeeded by that of the Tudors.

RICHARD DE BURY. See AUNGERVILLE.

RICHARD PLANTAGENET, earl of Cornwall, a German emperor (known in English history as king of the Romans), born in Winchester in January, 1209, died April 2, 1272. He was the younger son of King John of England, was engaged in the French wars of his brother Henry III., and fought in Palestine. During the anarchy following the death of Conrad IV. his wealth secured him a partial election to the imperial throne (1256), while his opponents chose Alfonso of Castile. Richard was crowned at Aix-la-Chapelle in May, 1257, but achieved no general recognition. He took part in the troubles of England, and was made prisoner by Simon de Montfort at the battle of Lewes, May 13, 1264. He finally quitted Germany in 1269. The tin mines of Cornwall made him the richest prince in Christendom.

RICHARDS, Brinley. See supplement.

RICHARDS, Thomas A. See supplement.

RICHARDS, William T. See supplement.

RICHARDSON, the S. E. county of Nebraska, separated from Missouri on the east by the Missouri river, bordering S. on Kansas, and watered by the Nemaha and other streams; area, about 550 sq. m.; pop. in 1870, 9,780. It is traversed by the Atchison and Nebraska railroad. The surface is undulating and the soil very fertile. There are extensive prairies and numerous groves. The chief productions in 1870 were 140,143 bushels of wheat, 1,003,010 of Indian corn, 143,006 of oats, 98,056 of potatoes, 10,749 lbs. of wool, 164,358 of butter, and 15,398 tons of hay. There were 3,924 horses, 3,829 milch cows, 6,077 other cattle, 3,712 sheep, and 12,743 swine; 3 brick manufacturing and 3 saw mills. Capital, Falls City.

RICHARDSON, Benjamin Ward, an English physician, born at Somerby, Leicestershire, Oct. 31, 1828. He took his degree in 1854 at the university of St. Andrews, became a member of the royal college of physicians in 1856, and gained the Astley Cooper prize of £300 for his treatise on the coagulation of the blood, and the Fothergillian gold medal for his disquisition on the diseases of the foetus. He

was the first to employ ether spray for local pain (1866), and in 1867 he introduced methylene bichloride as a general anæsthetic. He has published "Discourses on Practical Physics," and many monographs in periodicals, and edited the "Journal of Public Health," founded by him, and the "Social Science Review."

RICHARDSON, Charles, an English philologist, born in July, 1775, died at Feltham, Middlesex, Oct. 6, 1865. In 1815 appeared his "Illustrations of English Philology," in which he advocated the principles set forth by Horne Tooke. He undertook the lexicographical portion of the "Encyclopædia Metropolitana," the first part appearing in January, 1818; but after the issue of the fourth part the work was suspended for some years. The publication of the dictionary as a separate work was commenced in January, 1835, and finished at the end of 1837 (2 vols. 4to). He also published a volume "On the Study of Languages" (12mo, 1854), an exposition of the principles laid down in the "Diversions of Parley."

RICHARDSON, James, an English traveller, born in Boston, Lincolnshire, Nov. 3, 1809, died at Ungurutua, central Africa, March 4, 1851. He early visited Algeria and the Barbary states, and in 1845 travelled across the desert of Sahara as far as Ghadames and Ghat, and after his return published "Travels in the Great Desert of Sak'ara" (2 vols., London, 1849). The English government placed him at the head of a new expedition, and, joined by Barth and Overweg, he left Tripoli in 1850, and was the first European visitor of the stony desert of Hammadah, whence he proceeded to Bornoo, where he died. Bayle St. John edited his "Narrative of a Mission to Central Africa" (2 vols., 1853).

RICHARDSON, Sir John, a Scottish naturalist, born in Dumfries, Nov. 5, 1787, died near Grasmere, June 5, 1865. He entered the navy in 1801 as an assistant surgeon, and subsequently became acting surgeon in the Hercules, 74. In 1819-'22 and 1825-'7 he accompanied Sir John Franklin in his arctic expeditions as surgeon and naturalist, and in the second with one detachment of the party explored the coast E. of the Mackenzie to the mouth of the Coppermine river. In 1848 he commanded one of the three expeditions which went out in search of Sir John Franklin, and returned in November, 1849. In 1855 he retired from the naval service. His most important work is the *Fauna Boreali-Americana* (4 vols. 4to, London, 1829-'37), in which he was assisted by Swainson and Kirby. He also published "The Arctic Searching Expedition, a Journal of a Boat Voyage through Rupert's Land and the Arctic Sea," &c. (2 vols. 8vo, 1851), and "The Polar Regions" (8vo, Edinburgh, 1861).

RICHARDSON, Samuel, an English author, born in Derbyshire in 1689, died in London, July 4, 1761. He was apprenticed to a printer of London, with whom he remained several years in the capacity of foreman. He then set up a

printing office for himself, and obtained the employment of printing the journals of the house of commons. In 1754 he was master of the stationers' company. To his avocation of printer he gradually united that of preparing indexes, prefaces, or dedications to the works which he printed; and finally, after he was 50 years old, he wrote his novel "Pamela" (2 vols. 8vo, 1741), five editions of which were published within a year. He afterward wrote two additional volumes, which are considered greatly inferior to the first. The ridicule of Fielding is well known. Richardson was deeply hurt by it, and predicted for Fielding a speedy fall into oblivion. In 1748-'9 appeared "The History of Clarissa Harlowe" (8 vols.), which, besides passing through several editions at home, was speedily translated into French and German. His last work of fiction was "The History of Sir Charles Grandison" (6 vols., 1753-'54). He also published "Æsop's Fables with Reflections," and "Familiar Letters to and from several Persons upon Business and other Subjects," out of which the project of "Pamela" had arisen. His "Correspondence" was published by Mrs. Barbauld in 1804 (6 vols. 12mo). A condensed edition of "Clarissa Harlowe" appeared in New York in 1874.

RICHELIEU, a S. W. county of Quebec, Canada, bounded N. W. by the St. Lawrence river; area, 189 sq. m.; pop. in 1871, 20,048, of whom 19,317 were of French origin or descent. It is intersected by the Richelieu river, and bounded S. E. by the Yamaska. Capital, Sorel.

RICHELIEU, Armand Jean Duplessis, cardinal and duke de, a French statesman, born in Paris, Sept. 5, 1585, died there, Dec. 4, 1642. He was first destined to the career of arms, and began his military education as marquis du Chillon; but his elder brother having resigned the bishopric of Luçon, he decided to take holy orders in order to succeed to that office. He studied theology, and was consecrated bishop on April 16, 1607. In 1614 he was one of the deputies of the clergy to the states general, and ingratiated himself with Maria de' Medici, assisted by Barbin, then comptroller of the treasury, and by Marshal d'Ancre. He was appointed almoner of the queen mother, and in November, 1616, he entered the council as secretary of state. When, after the murder of Marshal d'Ancre, Maria de' Medici was exiled to Blois, Richelieu accompanied her, actuated less by gratitude than by self-interest. His efforts to bring about a reconciliation between the king and his mother resulted only in his own banishment to his diocese of Luçon, which was followed in 1618 by a removal to Avignon, where he produced among other works one entitled *De la perfection du Chrétien*, a book of exalted asceticism. When Maria de' Medici was recalled to the court, she reinstated Richelieu in favor. From that period his credit constantly increased. Having strengthened his position by the marriage of his niece

with the nephew of the duke de Luynes, constable of France, he received the cardinal's hat (1622), reëntered the state council, and soon after, in spite of the unabated dislike of Louis XIII., rose to the premiership. His policy comprised three principal designs for the consolidation of the monarchy and the greatness of France: 1, the consummation of the work of Louis XI. by the extinction of the last remains of feudalism, and the full subjection of the high nobility to the royal power; 2, the subjugation of Protestantism in France, where it had assumed a character as much political as religious; 3, the abasement of the house of Austria, by crushing its ambition for universal domination, and consequently the elevation of the power of France abroad. As a preliminary step, he took from Austria the passes of the Valtellina, and secured them by treaty (1626) to Switzerland; and in the same year he set on foot the war against the Protestants and England, which extended to them her protection. Richelieu determined to strike at once a decisive blow, by taking from the Protestants their most important stronghold. The siege of La Rochelle was begun, and prosecuted with an activity to which the presence of the cardinal himself added a new impulse. The besieged made so desperate a resistance that the population of the city was reduced by war and famine from 30,000 to 5,000 souls, when they surrendered on Oct. 28, 1628. This event, followed by the treaty of Alais and the edict of Nîmes, put an end to the political power of Protestantism in France, and one of Richelieu's designs was accomplished. The other, against the high nobility, had already been attained by the imprisonment in the castle of Vincennes of the marshal d'Ornano, confidant and favorite of Gaston of Orleans, brother of the king. On hearing of that bold measure, the lords hastened to Fontainebleau, and there laid the first plot against the life of the cardinal, who, being informed of it, decided at once to make such an example as would strike terror into the hearts of his enemies. The count de Chalais of the house of Périgord, a giddy young man, led away far more by his love for the duchess de Chevreuse than by any political hatred, was arrested and imprisoned in the castle of Amboise. It is said that he was there seduced into disclosures against the queen by promises of mercy, but he was beheaded in 1626, his accomplices being either detained in prison or dispersed. But Richelieu meant to bring the nobility to practical obedience and submission to the royal power. In order to stop a bloody mania which threatened to deprive the country of the flower of its young noblemen, the penalty of death had been proclaimed against those who should fight duels. In defiance of the ordinance, in 1627 François de Montmorency, seigneur de Bouteville, and the count des Chapelles, young nobles of the highest rank, fought in Paris, in the Place Royale itself, and

both paid the penalty with their lives. The consolidation of the government at home did not divert the cardinal from carrying out his plans abroad. Charles de Gonzague, duke of Nevers, legitimate heir to the duchy of Mantua, without any help but the protection of France, was maintained in possession of his inheritance by force of arms. This war set at variance for the first time the cardinal and Maria de' Medici, who now joined Anne of Austria in opposition to the prime minister. The misunderstanding soon became a deep hatred. The queen mother determined to destroy her former favorite, and the cardinal was informed of his dismissal. There was great exultation at court, but Richelieu went to Versailles, where Louis XIII. had gone to hunt, and in a brief interview fairly frightened him into a reconciliation. This event is known under the name of *la journée des dupes*. Richelieu, more powerful than ever, took revenge at once upon his declared opponents. Marillac, who had been selected as his successor, was exiled to Lisieux, while his more important brother, the marshal de Marillac, was imprisoned and afterward put to death. Maria de' Medici did not yet consider herself defeated, and with the assistance of Gaston of Orleans laid new plots against the cardinal. This proved her ruin; she was exiled from France in 1631, while her partisans either shared her fate or were cast into prison, and for years she wandered about, pursued by the implacable resentment of Richelieu. In 1631, the year when Richelieu was elevated to the dukedom and peerage, her former associate the duke of Orleans and the marshal duke of Montmorency organized a new rebellion, but were overthrown at Castelnaudary, and Montmorency was executed. The thirty years' war was then raging in Germany. Richelieu did not hesitate to side with the Protestants against the house of Austria, and assisted Gustavus Adolphus by subsidies. The power of Richelieu had now attained its highest prosperity at home and abroad, both his domestic and foreign policy being crowned with success. While the power of Germany was assailed through the sword of the king of Sweden, the revolution was at the same time encouraged in England, whose court had been a refuge for Maria de' Medici. When Gustavus Adolphus fell at Lützen (1632), Richelieu contrived to secure to France new possessions on the left bank of the Rhine, and the services of the duke of Saxe-Weimar with his army. He now declared war against Spain, and was present at the capture of Perpignan (1642). At last Austria was humiliated, Portugal was separated from Spain (1640), French influence predominated in Catalonia, England was in full revolution, and France quiet and prosperous. Still, the administration of Richelieu was again threatened by intrigues at court or treason in the camps. An attempt, based upon a passion of Louis XIII. for Mlle. de Lafayette, had no result but the retirement of the intended mis-

tress to the convent of Chaillot, and the dismissal of the king's ordinary confessor. Nor was the rebellion of the count de Soissons, prince of the blood, any more successful, its leader being killed in his first battle against the royal troops at Sedan (1641). The last of these conspiracies of the nobility was the secret treaty of alliance concluded with Spain by the dukes of Bouillon and Orleans. The young marquis de Cinq-Mars, although indebted to Richelieu for the high favor and the high offices that he enjoyed at court, was one of the first among the conspirators. He was executed at Lyons, with his friend De Thou, Sept. 12, 1642. After this last vindication of his power, Richelieu, an invalid, returned to Paris in triumph, carried on a litter by his guards, escorted by an army, and surrounded by the utmost pomp. Two months after, his unrivalled fortune being at its very zenith, he died. Richelieu was the founder of the French academy. He also founded the *jardin du roi*, now the *jardin des plantes*, and enlarged the Sorbonne. He wrote two plays, *Mirame*, a comedy, and *La grande pastorale*, neither of any value. He is regarded as the author of *Mémoires du cardinal de Richelieu*, first published complete by Petitot in his collection of memoirs relating to French history (Paris, 1823); of the *Testament politique du cardinal de Richelieu* (2 vols., 1764); and of the *Journal du cardinal de Richelieu, qu'il a fait durant le grand orage de la cour* (2 vols., Amsterdam, 1649). The *Lettres, instructions diplomatiques*, &c., of Richelieu have been edited by Avenel (6 vols., Paris, 1853-'68). See also Martineau, *Le cardinal de Richelieu* (1865 *et seq.*).—The cardinal's elder brother, ALPHONSE LOUIS DUPLESSIS, who had resigned the bishopric of Luçon to retire to a Carthusian convent, was reluctantly compelled to resume high offices in the church. Archbishop of Aix in 1626, archbishop of Lyons in 1629, grand almoner of France in 1632, he died in 1653, 71 years of age. Richelieu had two sisters, of whom Françoise, the elder, married René de Vignerod, and had a son who died in 1646, leaving two sons, the elder of whom, LOUIS FRANÇOIS ARMAND DUPLESSIS, known as the marshal de Richelieu, born March 13, 1696, succeeded to the dukedom of his great-uncle, commanded in the seven years' war, was one of the most notorious rousés and worthless characters in French history, and died Aug. 8, 1788. His grandson, ARMAND EMMANUEL DUPLESSIS, duke de Richelieu, born in Paris, Sept. 25, 1766, was active as an agent of the French royal family during the revolution, entered the Russian civil service, was governor of Odessa, which he embellished, under Alexander I., refused to serve Napoleon, and was prime minister under Louis XVIII. He succeeded in procuring for the great European powers, at the congress of Aix-la-Chapelle (1818), terms much less severe than they had required from the French gov-

ernment in 1815. Though poor, he refused a national recompense from the chambers, and, when a pension of 50,000 francs was conferred on him, gave it to found a hospital at Bordeaux. He died March 16, 1822, and was succeeded in his titles by his sister's son, Armand François Odet de Chapelle de Jumilhac.

RICHER, Edouard, a French author, born in Noirmoutiers, department of Vendée, June 12, 1792, died in Nantes, Jan. 21, 1834. His father fell in battle with the Austrians in 1793. The national convention by a special decree adopted him, but from delicate health he did not follow his father's profession. He published in 1816 a poem entitled *Victor et Amélie*, and in 1821 a history of Brittany. He became a convert to the doctrines of Swedenborg, and wrote *La religion du bon sens, La clef du mystère*, &c. A collection of his Swedenborgian writings appeared at Nantes in 8 vols. (1832-'6), and his literary remains were edited in 1836, with a biography, by Émile Souvestre.

RICHERAND, Anthelme, baron, a French physiologist, born in Belley, Feb. 4, 1779, died in Paris, Jan. 25, 1840. He graduated at the Paris school of medicine in 1799, and at first devoted himself to the study of physiology. He was appointed surgeon to the hospital St. Louis, and in 1807 professor of surgical pathology in the faculty of medicine. When the allied troops occupied Paris on the fall of Napoleon, Richerand was distinguished by the vigor and devotion with which he cared for the sick and wounded of all nationalities, for which he received many honors from foreign governments, and the French government made him a baron and surgeon-in-chief to the three first legions of the national guard of Paris. His principal works are: *Nouveaux éléments de physiologie* (Paris, 1801), which passed through ten editions and was translated into many languages; *Leçons sur les maladies des os* (1805); *Nosographie et thérapeutique chirurgicales* (1805); *De l'enseignement actuel de la médecine et de la chirurgie* (1816); *Des officiers de santé et des jurys médicaux* (1834); and *De la population dans ses rapports avec la nature des gouvernements* (1837).

RICHLAND, the name of counties in six of the United States. **I.** A central county of South Carolina, bordered W. and S. W. by the Congaree river and E. by the Wateree, and drained by their branches; area, 465 sq. m.; pop. in 1870, 23,025, of whom 15,177 were colored. It has a somewhat hilly surface, with pine forests, and a fertile soil. Several railroads terminate at Columbia. The chief productions in 1870 were 121,495 bushels of Indian corn, 12,805 of sweet potatoes, 2,565 tons of hay, 5,453 bales of cotton, 26,823 lbs. of rice, and 1,082 of wool. There were 623 horses, 990 mules and asses, 1,367 milch cows, 2,623 other cattle, 1,063 sheep, and 5,579 swine; 1 manufactory of railroad cars, 3 of iron castings, 5 of machinery, 1 of cotton-seed oil, 7 flour mills, and 4 saw mills. Capital,

Columbia, which is also the capital of the state. **II.** A N. E. parish of Louisiana, drained by Bayou Beuf and other streams; area, about 550 sq. m.; pop. in 1870, 5,110, of whom 2,705 were colored. The surface is low and level and the soil highly productive. It is traversed by the North Louisiana and Texas railroad. The chief productions in 1870 were 95,225 bushels of Indian corn, 3,235 of peas and beans, 19,839 of sweet potatoes, and 6,051 bales of cotton. There were 958 horses, 653 mules and asses, 2,829 milch cows, 2,968 other cattle, 1,843 sheep, and 11,094 swine. Capital, Rayville. **III.** A N. county of Ohio, drained by the head waters of the Walhonding river; area, about 450 sq. m.; pop. in 1870, 32,516. It has an undulating surface and a fertile soil. Several railroads centre at the county seat. The chief productions in 1870 were 588,575 bushels of wheat, 621,881 of Indian corn, 700,830 of oats, 113,877 of potatoes, 36,740 tons of hay, 269,981 lbs. of wool, 833,005 of butter, and 58,543 of maple sugar. There were 8,580 horses, 8,979 milch cows, 10,091 other cattle, 71,093 sheep, and 25,116 swine; 5 manufactories of agricultural implements, 6 of brick, 24 of carriages and wagons, 12 of men's clothing, 12 of furniture, 3 of machinery, 4 of sash, doors, and blinds, 10 of tin, copper, and sheet-iron ware, 9 of woollen goods, 8 iron foundries, 14 tanneries, 3 breweries, 22 flour mills, and 11 saw mills. Capital, Mansfield. **IV.** A S. E. county of Illinois, drained by tributaries of the Wabash river; area, about 375 sq. m.; pop. in 1870, 12,803. It has a nearly level surface and a fertile soil. It is intersected by the Ohio and Mississippi railroad. The chief productions in 1870 were 150,268 bushels of wheat, 482,594 of Indian corn, 204,634 of oats, 11,422 tons of hay, 2,000 lbs. of tobacco, 31,612 of wool, 87,166 of butter, and 8,080 gallons of sorghum molasses. There were 3,254 horses, 2,723 milch cows, 4,054 other cattle, 12,447 sheep, and 12,256 swine; 3 manufactories of furniture, 2 of sash, doors, and blinds, 4 saw mills, and 2 flour mills. Capital, Olney. **V.** A S. W. county of Wisconsin, bordered S. by Wisconsin river and drained by Pine river and Knapp's and Mill creeks; area, 576 sq. m.; pop. in 1870, 15,731. It has a generally level surface and a fertile soil. The Chicago, Milwaukee, and St. Paul railroad skirts the S. border. The chief productions in 1870 were 189,900 bushels of wheat, 345,787 of Indian corn, 183,952 of oats, 108,926 of potatoes, 17,349 tons of hay, 9,126 lbs. of tobacco, 68,573 of wool, 316,734 of butter, 25,544 of cheese, and 350,436 of hops. There were 3,719 horses, 4,668 milch cows, 1,117 working oxen, 5,715 other cattle, 21,014 sheep, and 13,113 swine; 2 manufactories of furniture, 6 of carriages and wagons, 5 flour mills, and 8 saw mills. Capital, Richland Centre. **VI.** An E. county of Dakota, recently formed and not included in the census of 1870; area, about 1,400 sq. m. It is separated from Min-

nesota by Red river, and is watered by its affluents. The river bottoms are fertile; the rest of the county consists of rolling prairies.

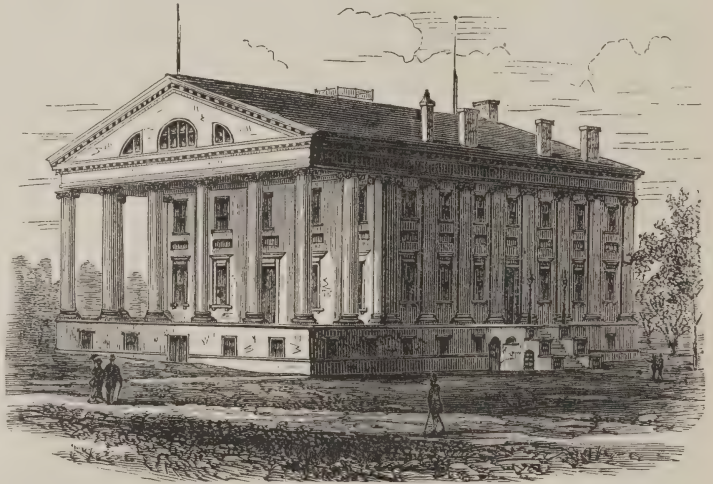
RICHMOND, the name of counties in four of the United States. **I.** The southernmost county of New York, comprising Staten island, Shooter's island at the entrance of Newark bay, and the islands in Staten Island sound; area, 58½ sq. m.; pop. in 1870, 33,029. The chief productions in 1870 were 35,083 bushels of Indian corn, 12,001 of oats, 34,863 of potatoes, and 7,610 tons of hay. There were 2 bleaching and dyeing establishments, 4 manufactories of brick, 7 of carriages and wagons, 1 of machinery, 1 of linseed oil, 1 of lead and zinc, 5 of sash, doors, and blinds, 4 ship yards, 2 flour mills, and 5 distilleries. Capital, Richmond. (See STATEN ISLAND.) **II.** An E. county of Virginia, bordered S. W. by the Rappahannock river; area, about 175 sq. m.; pop. in 1870, 6,503, of whom 3,028 were colored. It has a nearly level surface and fertile soil. There are extensive forests of pine, and the waters abound with oysters. The chief productions in 1870 were 29,769 bushels of wheat, 121,680 of Indian corn, 9,781 of oats, 1,736 bales of cotton, and 1,913 lbs. of wool. There were 552 horses, 993 milch cows, 1,063 working oxen, 1,274 other cattle, 1,100 sheep, and 4,032 swine; 3 flour mills, and 2 saw mills. Capital, Warsaw. **III.** A S. county of North Carolina, bordering on South Carolina, and bounded N. E. by Lumber river and W. by the Yadkin; area, about 730 sq. m.; pop. in 1870, 12,882, of whom 6,598 were colored. The surface is undulating and the soil productive. It is traversed by the Carolina Central railroad. The chief productions in 1870 were 19,604 bushels of wheat, 131,855 of Indian corn, 21,350 of oats, 11,970 of peas and beans, 43,364 of sweet potatoes, and 5,130 bales of cotton. There were 871 horses, 768 mules and asses, 2,346 milch cows, 3,295 other cattle, 2,247 sheep, and 19,088 swine. Capital, Rockingham. **IV.** An E. county of Georgia, separated from South Carolina by the Savannah river; area, about 350 sq. m.; pop. in 1870, 25,724, of whom 12,565 were colored. It has an uneven surface, and the soil is fertile near the streams. It is intersected by several railroads terminating in Augusta. The chief productions in 1870 were 3,610 bushels of wheat, 77,895 of Indian corn, 18,544 of sweet potatoes, 4,286 lbs. of rice, and 2,017 bales of cotton. There were 342 horses, 507 mules and asses, 739 milch cows, 1,334 other cattle, 378 sheep, and 3,718 swine; 2 manufactories of cotton goods, 4 of iron castings, 8 of machinery, 2 of marble and stone work, 2 of saddlery and harness, 1 of woollen goods, 5 flour mills, and 5 saw mills. Capital, Augusta.

RICHMOND. **I.** A S. county of Quebec, Canada, drained by the St. Francis river, an affluent of the St. Lawrence; area, 525 sq. m.; pop. in 1871, 11,213, of whom 3,718 were of French, 2,935 of English, 2,463 of Irish, and

1,872 of Scotch origin or descent. It is traversed by the Grand Trunk railway. Capital, Richmond East. **II.** A county of Nova Scotia, Canada, occupying the S. portion of Cape Breton island, with Madame and smaller islands adjacent; area, 623 sq. m.; pop. in 1871, 14,268, of whom 6,965 were of French, 4,902 of Scotch, 1,437 of Irish, and 746 of English origin or descent. Capital, Arichat, on Madame island.

RICHMOND, a city, port of entry, and the capital of Virginia and of Henrico co., the largest city in the state, on the N. bank of James river, here crossed by five bridges, at the head of tide water, and at the lower falls, about 150 m. from its mouth, and 95 m. S. S. W. of Washington; lat. $37^{\circ} 32' 17''$ N., lon. $77^{\circ} 27' 28''$ W.; pop. in 1790, 3,761; in 1800, 5,737; in 1810, 9,785; in 1820, 12,067; in 1830, 16,060; in 1840, 20,153; in 1850, 27,570; in 1860, 37,910; in 1870, 51,038, of whom 3,778 were foreigners and 23,110 colored; in 1874, 60,705. The city is built on Richmond and Shockoe hills, which are separated by Shockoe creek, and is surrounded by beautiful scenery. It is regularly laid out and well built; the streets, which are lighted with gas, cross each other at right angles. There is a line of horse cars. On Shockoe hill are the state capitol and other public buildings. The capitol, in the centre of a park of eight acres, is a large and imposing edifice, having at one end a handsome portico; it contains in its central hall Houdon's celebrated statue of Washington, and near by a marble bust of Lafayette. On the east of the capitol square is the governor's mansion. On the esplanade leading from the mansion toward the W. gate of the square stands a monument by Crawford, consisting of a bronze equestrian statue of Washington rising from a pedestal of granite surrounded by bronze figures of Patrick Henry, Thomas Jefferson, John Marshall, George Mason, Thomas Nelson, and Andrew Lewis. The square also contains a marble statue of Henry Clay. Among the principal public buildings, in different parts of the city, are the state penitentiary, state armory, court house, jail, custom house (also occupied by the post office), theatre, and two markets. There are several cemeteries, the handsomest of which is Hollywood. The falls of James river afford im-

mense water power. Vessels drawing 16 ft. can ascend to within a mile of the centre of the city, at a place called Rockets, and those of 18 ft. draught to Warwick, 3 m. below. A canal has been built around the falls, and above them there is navigation for over 200 m. Improvements are in progress in the river, which are expected to render the docks accessible by vessels drawing 19 ft. The James River and Kanawha canal extends to Buchanan, 196½ m. Richmond is the point of intersection of five lines of railroad, viz.: Chesapeake and Ohio; Richmond, Danville, and Piedmont; Richmond, Fredericksburg, and Potomac; Richmond and Petersburg; and Richmond, York River, and Chesapeake. The value of its foreign commerce for the year ending June 30, 1874, was as follows: imports, \$156,260; exports, \$3,463,626. The number of entrances was 33, tonnage 9,032; clearances 74, tonnage 36,305; number of vessels belonging in the district, 31,



State Capitol of Virginia.

tonnage 2,528. The chief articles of export are tobacco and flour. The latter is noted for its excellent quality, and is mostly shipped to Brazil. Great quantities of tobacco are shipped to the north. The number of entrances in the coastwise trade for the year ending Sept. 30, 1873, was 719, tonnage 512,613; clearances, 579, tonnage 487,004. Regular lines of steamers run to Norfolk, Baltimore, Philadelphia, and New York. The manufactures give employment to more than 4,000 men. The principal establishments are 13 iron works, machine shops, and foundries, producing all kinds of wrought- and cast-iron work, steam engines, agricultural implements, tobacco machinery, &c.; one sugar refinery, one tannery, four manufactories of plug and smoking tobacco, four of cigars, three of coaches and wagons, one each of saws, files, &c., of sash, doors, and blinds, of sheetings and shirtings, of stoneware, sumach, cedar ware, bedding and

corn husks, furniture, and paper boxes; a type foundry, a stone-cutting establishment, and five flouring mills, capable of producing 2,000,000 barrels annually. The Tredegar company has a capital of \$1,000,000 and employs 1,200 hands, producing spikes, axles, bar iron, freight cars, &c., to the annual value of \$3,250,000. There are several granite quarries in the vicinity. The city contains four national banks, with an aggregate capital of \$1,400,000, six state banks and savings institutions, with \$1,000,000 capital, and ten insurance companies. It is divided into six wards, and is governed by a mayor and council. The police force on Feb. 1, 1875, consisted of 82 men. The fire department comprises five steam engine companies, two hook and ladder companies, and one hose company, with a total of 100 men, and has a telegraphic alarm. The city is supplied with water from two reservoirs, with an aggregate capacity of 50,000,000, gallons, which are filled from the river by force pumps. The assessed value of real estate in 1874 was \$41,600,000. The receipts during the year ending Feb. 1, 1875, amounted to \$1,574,355 37, including \$68,670 84 on hand at the beginning of the period; disbursements, \$1,495,717 56; balance, \$78,637 81. The bonded debt on Feb. 1, 1875, amounted to \$4,239,727 97; floating debt, \$32,379 18; total, \$4,322,107 15. The whole number of persons admitted to the city almshouse during the year ending on that date was 812; average number of inmates, 245. One of the state insane asylums is situated here. There are several orphan asylums and other charitable institutions. The public schools are under the charge of a board of nine members, besides the mayor, who is president *ex officio*. There are seven school houses for white children, with an aggregate seating capacity of 3,093, and five for colored children, with a seating capacity of 1,758. The number of schools in operation during the year ending June 30, 1874, was 92, of which 59 (1 high, 21 grammar, and 37 primary) were white, and 33 (5 grammar and 28 primary) were colored; whole number of teachers, 105, of whom 10 were colored; pupils enrolled, 4,959 (3,041 white and 1,918 colored); average daily attendance, 3,595 (2,228 white and 1,367 colored). The expenditure for school purposes during the year ending Aug. 1, 1874, amounted to \$80,932 52, of which \$50,542 90 were for teachers' wages and \$19,108 26 for construction and furniture; value of school property on the above date, \$207,537 75. There are numerous private schools. Richmond college, under the control of the Baptists, founded in 1840, has a library of 6,000 volumes and a law department organized in 1868. The Richmond institute (Baptist), for theological instruction, was founded in 1868; it has a library of 1,200 volumes. The medical college of Virginia was established in 1851. Seven daily (two German), four semi-weekly, and ten weekly newspapers, and two semi-monthly and seven monthly periodicals are published. There

are 49 churches, viz.: 15 Baptist (7 colored), 1 Disciples', 6 Episcopal, 1 Friends', 4 Jewish, 3 Lutheran, 11 Methodist (1 colored), 4 Presbyterian, 3 Roman Catholic, and 1 Unitarian. —Richmond was founded by William Byrd in 1737. It was incorporated in 1742, and became the state capital in 1779, at which period it was a small village. On the night of Dec. 26, 1811, the theatre took fire while crowded with spectators, of whom upward of 70 perished, among them the governor of the state. A church, known as the "Monumental" church, has been erected on the site. In May, 1861, Richmond was made the seat of government of the "Confederate States of America," and it so continued until their overthrow in April, 1865. Although geographically near the N. E. frontier, it was practically the military centre of the confederacy. If the railroads meeting here, and extending to every part of the south and southwest, had been planned for military purposes, they could not have been better placed. The defensive position of the city is excellent. On two sides it is covered by the James; on the other sides the Chickahominy and swamps form a natural line of exterior defence. Here also were mills, manufactories, and foundries. When McClellan landed on the peninsula in the spring of 1862, the immediate capture of Richmond was apprehended; and even while he was held in check at Yorktown a panic arose. On April 21 the confederate congress hastily adjourned; the government archives were packed up, and the railroads were crowded with fugitives. The panic increased when Yorktown was abandoned, Norfolk seized, and the Merrimack destroyed. But the state legislature resolved that the city should be defended to the last extremity; the governor ordered that all business except the filling of government contracts should be suspended at 2 o'clock; the militia was to assemble at 3 and drill till sunset. At this time there were no fortifications, and no attempt was made to obstruct the passage of the Chickahominy; and a determined attack at any time during the campaign would have had good chances of success. From August, 1862, to June, 1864, while the war was carried on in northern Virginia, Maryland, and Pennsylvania, Richmond was held only by a few thousand militia; and several expeditions, mostly of cavalry, were undertaken rather with the design of liberating the Union prisoners and destroying the public works than of permanently holding the city, which might have been easily retaken by the confederates, who were in force between it and the Union army of the Potomac. In March, 1864, Kilpatrick, with 4,000 cavalry, came on the north within 4 m. of the city, penetrating two lines of defences, but was stopped at the third, and abandoned the enterprise. At the same time Dahlgren with a few hundreds reached the inner line from the south, but was repulsed, himself killed in the retreat, and his command dis-

persed. Meantime the defences of Richmond had been made too strong to be assailed in front, and the operations of Grant, although really directed against that city, took the form of the siege of Petersburg. (See PETERSBURG, SIEGE OF.) Although several strong demonstrations were made against Richmond during the siege, the exterior lines were never carried, the interior lines were never even seen, and in the city itself there was nothing to show that it was beleaguered. The only garrison was the militia of the city, under Ewell, and little was known of what was passing in the army. When, on the morning of April 2, 1865, Gen. Lee informed Jefferson Davis that the army would abandon Petersburg and Richmond that night, there was a universal panic. The government archives were hastily packed up and taken to the station of the Danville railroad, by which the president and cabinet set off in a special train, and every possible effort was made by the people to escape. As night fell the disorder rose to tumult, riot, and general pillage. Toward midnight the last of the troops had crossed the James, and Ewell, who commanded the rear guard, ordered the bridges to be burned, the ironclads in the river blown up, and everything destroyed which could be of use to the enemy. In the very heart of the city were four great government warehouses filled with tobacco, which, in spite of the remonstrances of the mayor, Ewell ordered to be set on fire. Close by were the Gallego flour mills, said to be the largest in the world, and the arsenals filled with loaded shells. The flames spread from street to street, covering acres of the business part of the city, and the tumult and pillage continued all night. Early the next morning the federal general Weitzel entered the city with 20 horsemen, finding before the abatis in his front a line of torpedoes, still marked by flags, followed by three lines of works, each of the inner ones commanding that exterior to it. The whole Union army soon marched in. Gen. Shepley, who had filled the same post at New Orleans, was made military governor. The conflagration was still spreading, and every effort to suppress it was unavailing till toward evening, when the wind veered, and the flames died out. Fully one third of Richmond had been burned, comprising nearly all its business portion.

RICHMOND, a city and the county seat of Wayne co., Indiana, on the E. side of the east branch of Whitewater river, 68 m. E. of Indianapolis; pop. in 1850, 1,443; in 1860, 6,603; in 1870, 9,445; in 1875, 11,579, of whom 1,581 were Germans and 422 Irish. It is built on rolling ground 700 ft. above tide water, and is surrounded by a fertile agricultural district, with which it has an important trade. There is a good fire department. Horse cars traverse the principal streets. In the N. E. corner of the city are fair grounds 33 acres in extent. Richmond is an important railroad centre, the

Little Miami, the Cincinnati, Richmond, and Fort Wayne, and the Cincinnati, Eaton, and Richmond railroads, as well as several divisions of the Pittsburgh, Cincinnati, and St. Louis railroad, centring here. There is good water power. The number of manufacturing establishments in 1874 was 127; number of hands employed, 1,507; capital invested, \$1,807,785; value of raw materials used, \$795,784; of products, \$2,729,346. The chief articles of manufacture are threshing machines, portable engines, ploughs, flour and saw mill works, school and church furniture, and burial caskets of wood. The slaughtering of hogs is extensively carried on, the number slaughtered in 1874 being 27,700. There are three banks, with an aggregate capital of \$900,000. The taxable value of property in 1875 was \$8,383,767. The principal charitable institutions are the orphans' home and the home for friendless women. There are nine public school houses, with a high school and inferior grades, having 37 teachers and an enrollment of 1,900 pupils. There are also two Lutheran and two Roman Catholic schools and a business college. The Friends' academy is an important institution. Earlham college, also under the auspices of the Friends, was founded in 1859. It has preparatory and collegiate departments, and admits both sexes. In 1874-'5 it had 14 instructors, 221 students, and a library of 3,500 volumes. The buildings are about half a mile W. of the city. Richmond has two theatres, two daily and six weekly (two German) newspapers, a public library of 10,000 volumes, and 20 churches: 2 Baptist, 1 Christian, 1 Episcopal, 1 Evangelical Association, 3 Friends', 2 Lutheran, 4 Methodist, 1 New Jerusalem, 2 Presbyterian, 2 Roman Catholic, and 1 Wesleyan.

RICHMOND, a town of Surrey, England, 10 m. W. S. W. of St. Paul's, London; pop. in 1871, 15,113. It is built on the side and summit of an eminence on the Thames, and is famous for its scenery. It is well paved, lighted with gas, accessible by rail and steamboats hourly from the capital, and connected by bridge with Twickenham. It has a theatre, lecture hall, and numerous places of worship; and near by are Pembroke lodge, the seat of Earl Russell, within the park, and many other splendid residences. The Wesleyan theological seminary, on the hill, is a fine specimen of the Tudor style. The parish church contains monuments to Thomson, Edmund Kean, Dr. John Moore, Gilbert Wakefield, and other noted men who are buried here. The Star and Garter hotel, near the park, is celebrated alike for its diners and for the unrivalled prospect it commands. Originally built in 1738, it has been repeatedly enlarged, was partially destroyed by fire in 1870, and was rebuilt in 1872. Here the annual dinners of the bank of England directors and of many of the great commercial companies of London are given.—Richmond was originally called Schene or Scheen, afterward Sheen, and was a royal residence under

Edward I. and II. Edward III. died here in 1377. Chaucer was surveyor of the works of the palace in 1389. Anne, queen of Richard II., died here in 1394. In 1414 Henry V. founded a Carthusian priory, which was appropriated by Henry VIII. in 1540, restored by Mary in 1557, and suppressed by Elizabeth in 1559. The palace was burned down in 1498, but was rebuilt immediately after by Henry VII., who changed the name of Sheen to Richmond, from his title of earl of Richmond in Yorkshire before his coronation, and he died here in 1509. Mary temporarily imprisoned here Elizabeth, who afterward made it her favorite residence, and died here in 1603. Richmond park, originally New park, comprising 2,253 acres, surrounded by a brick wall 8 m. in circumference, was enclosed by Charles I. about 1636, and was thrown open to the public in 1752. The palace was partially destroyed under the commonwealth, and was pulled down in the next century. George III. joined the old palace park to Kew gardens. Sir W. Chambers built the Richmond observatory in 1769.

RICHMOND, Countess of. See BEAUFORT, MARGARET.

RICHMOND, Legh, an English clergyman, born in Liverpool, Jan. 29, 1772, died at Turvey, Bedfordshire, May 8, 1827. He graduated at Trinity college, Cambridge, in 1794, was ordained in 1797, became a curate in the Isle of Wight, and in 1805 chaplain of the Lock hospital, London, and in the same year was presented to the rectory of Turvey. He wrote "Annals of the Poor," including the celebrated story of the "Dairyman's Daughter," of which separately more than 4,000,000 copies in 19 different languages have been circulated. He also published "The Fathers of the English Church, or a Selection from the Writings of the Reformers and Early Protestant Divines of the Church of England" (8 vols. 8vo, 1807-'11), and "Domestic Portraitsures," consisting of memoirs of his three children.

RICHTER, Johann Paul Friedrich, popularly known as **JEAN PAUL**, a German author, born at Wunsiedel, near Baireuth, March 21, 1763, died in Baireuth, Nov. 14, 1825. He studied in the gymnasium at Hof and in the university of Leipsic, and published his first work in 1783-'4. Poverty drove him from Leipsic, and during ten years he taught in private families. Subsequently he resided at Hof until his mother's death in 1797, when he returned to Leipsic, and in 1798 joined Herder at Weimar. In 1801 he married Karoline Mayer in Berlin, and removed to Meiningen, and next to Coburg, and in 1804 to Baireuth, where he spent the rest of his life in the enjoyment of a pension of 1,000 florins. The death in 1820 of his only son gave a blow to his health from which he never recovered. His writings abound in a bewildering variety of playful, witty, pathetic, childlike, and sublime thoughts, and are pervaded by a high moral tone; but his style is so incongruous and intri-

cate that Reinhold published in 1810 a special work to unravel his meaning. His principal works are: *Die unsichtbare Loge*, a novel (2 vols., Berlin, 1793); *Hesperus* (4 vols., 1794; translated into English by Charles T. Brooks, Boston, 1865); *Blumen-, Frucht- und Dornenstücke* (4 vols., 1796-'97; translated into English by E. H. Noel, with a memoir of the author by Carlyle, 2 vols., Boston, 1863); *Das Kampanerthal* (Erfurt, 1797; English translation, "The Campaner Thal and other Writings," Boston, 1863); *Titan* (Berlin, 1800-1803; translated by C. T. Brooks, 2 vols. 12mo, Boston, 1862); *Fliegeljahre* (4 vols., Tübingen, 1804-'5); *Vorschule der Aesthetik* (3 vols., Hamburg, 1804); and *Levana, oder Erziehungslehre* (Brunswick, 1807; 4th ed., enlarged from his posthumous papers, Stuttgart, 1861; English translation, Boston, 1863). The last two express his views on philosophy, in which he sympathized with Herder and Jacobi, and opposed Fichte. His complete works comprise 65 vols. (Berlin, 1826-'38). E. Förster and Christian Otto published *Wahrheit aus Jean Paul's Leben*, partly founded upon his autobiography (8 vols., Breslau, 1826-'33). Förster was the sole author of *Denkwürdigkeiten aus Jean Paul's Leben* (7 vols., Munich, 1863). Among the published correspondence of Jean Paul are his *Briefe an eine Jugendfreundinn* (Brandenburg, 1858). Carlyle was the first in 1827 to familiarize the English with Jean Paul's genius. In the United States appeared a biographical sketch after the German, and extracts from *Fliegeljahre*, translated by Eliza Buckminster Lee (Boston, 1842; new ed., 1864).

RICINUS. See CASTOR OIL.

RICKAREES, or **Ricarees**, called also Aricaras, Rees, and Black Pawnees, a tribe of Indians of the Pawnee family, living on the Upper Missouri. They are said to call themselves Starrahé and also Panani. They are an offshoot of the Pawnees of Platte valley, Nebraska, from whom they separated about a century ago. They were originally ten large tribes, but were reduced by smallpox in 1791 and by the hostility and oppression of the Teton and other Sioux. They were warlike, the men generally going naked, their heads adorned with feathers. They came into collision with the whites before 1810. Twelve years after they were near Cannon Ball river, in two palisaded villages of 141 lodges. On June 2, 1823, they attacked Gen. Ashley's party of traders, killing and wounding 23. Col. Leavenworth was sent against them, and defeated them in a severe battle, Aug. 9. They made peace, but fled during the night of the 13th, and their towns were fired by the traders. The Rickarees went to the Platte, and as the Sioux seized their country became wanderers. By 1825 they were again on the Missouri, where a treaty was made with them, July 11. As they still remained hostile, all trade with them was closed in 1831, when they again became wanderers. Some years later they returned from

the Platte and united with the remnants of the Mandans, and have since lived with them and the Minnetarees, engaging largely in agriculture. In 1862 they removed to Fort Berthold. During the civil war a number served as scouts in the army. By the treaty of July 27, 1866, \$75,000 a year is to be expended for the three tribes; and by executive order of April 12, 1870, a reservation of 8,640,000 acres in N. W. Dakota and E. Montana was assigned to them. They have begun to erect log huts instead of earth lodges, and have been assigned to the care of the American board of foreign missions, but up to 1875 had no missionary or school. They were reported in 1874 at 975, though Dr. Matthews estimates them at only 800.

RICKETS (Lat. *rachitis*, from Gr. *ῥαχίς*, the back bone), a disease of children characterized by an arrest of ossification, and leading to deformity, chiefly of the lower limbs. Rickets rarely occurs before the child is 12 months old, and commonly first shows itself in the second year. It is most frequent among those who inherit unhealthy constitutions, and who are ill fed or confined to a damp and badly ventilated atmosphere. According to Trouseau, 90 out of every 100 children affected with rickets have been either brought up entirely by hand or have been prematurely weaned. Very frequently the disease supervenes on some exhausting and long continued illness. Trouseau thinks the tardy evolution of the first teeth is indicative of a tendency to rickets. The first symptom of the complaint is an enlargement of the joints, the wrists, knees, &c. Afterward the long bones, particularly those of the lower extremities, give way under the weight of the body, and become bent, sometimes in one, sometimes in another direction; often the ribs are pressed in and the sternum pushed outward, making the child what is termed chicken-breasted; the bones of the pelvis and those of the spine become variously bent and deformed. This is due to a deficiency in the proportion of calcareous matter in the bones, which renders them less rigid than natural and liable to yield to the increasing weight of the body. The deformity of the chest produced in this manner may be so great as to seriously interfere with the functions of the heart and lungs. The bones of the head are never deformed, though rachitic children have frequently large heads, and the fontanelles are late in closing. During the progress of the disease the patient is pale and languid, and has a deficient or irregular appetite. It is very rarely fatal; after an uncertain period the appetite returns, the child recovers strength and flesh, and the bones attain their natural firmness; in after life the bones affected are found to be unusually hard and compact.—The treatment of rickets is mainly by a nutritious, digestible diet, fresh air, suitable clothing, and passive exercise. Tonics and chalybeates may be employed, and the tepid salt-water bath may be found useful.

RICORD, Philippe, a French physician, born in Baltimore, Md., Dec. 10, 1800. His father had come to the United States in 1790. In 1820 the son went to Paris, where he received his medical degree in 1826. He first practised at Olivet, near Orleans, and later at Croüy-sur-Oureq. From 1831 to 1860 he was surgeon-in-chief of the *hôpital du midi* in Paris. He has specially devoted himself to venereal diseases, his works on which have a wide reputation.—**ALEXANDRE**, his brother, born in Baltimore in 1798, received the degree of M. D. at Paris in 1824, and is author of several works on medicine and natural history.

RIDLEY, Nicholas, an English bishop, born at Wilmontswick, Northumberland, about 1500, burned at the stake in Oxford, Oct. 16, 1555. He graduated at Pembroke hall, Cambridge, in 1518, and in 1524 took holy orders. In 1527 he went to study at the Sorbonne, and was afterward at Louvain till 1529. On his return to Cambridge he was chosen under treasurer of the university. He became domestic chaplain to Archbishop Cranmer in 1537, vicar of Herne in Kent in 1538, and master of his college in 1540. He preached against the use of images and holy water, and gradually became a strenuous supporter of Protestant doctrines. At the instigation of Bishop Gardiner he was accused of preaching against the six articles, but the accusation being referred to Cranmer, he was acquitted. In 1545 he was made a prebendary of Westminster, and in 1547 bishop of Rochester. He sat on the commission that deprived Bonner of the bishopric of London, and in 1550 was appointed his successor; he also shared in the deposition of Bishop Gardiner. He assisted Cranmer in preparing the 41 articles. Having sought an interview with the princess Mary, he expressed his views very freely, and requested permission to preach before her, which was peremptorily refused. Moved by a sermon of Ridley's, Edward VI. converted Grey Friars and St. Bartholomew's priories, with their revenues, into charitable institutions, and his own house of Bridewell into a compulsory workhouse for such as were in distress through wilful idleness. In a sermon preached at St. Paul's Cross Ridley espoused the cause of Lady Jane Grey, and warned the people of the evil that would follow to Protestantism if Mary should come to the throne. On Mary's accession he was at once arrested and committed to the tower (July, 1553), and in April, 1554, was taken to Oxford, to attend a discussion on the real presence. At its close he was with Cranmer and Latimer adjudged an obstinate heretic, and confined at Oxford; and after many attempts to induce him to recant, he was led to the stake with Latimer. His works were collected by the Parker society (1 vol. 8vo, 1841).

RIDOLFI, Roberto, an Italian conspirator, born in Florence about 1520. He settled in London as a merchant and banker in 1554, acted there as secret agent for the pope and other

continental princes, and was engaged in several conspiracies against Queen Elizabeth. In 1569 he was imprisoned for a month and fined. In 1571 he visited Brussels, Paris, Rome, and Madrid, bearing credentials of disputed authenticity from Mary queen of Scots and the duke of Norfolk, empowering him to solicit aid to dethrone Elizabeth, and a papal decree annulling the forced marriage of Mary with Bothwell. The duke of Alba received him coldly; the pope gave him money and recommended him to Philip II. of Spain. At Madrid, where he arrived July 3, 1571, he laid before the king and six of his chosen councilors a plan for assassinating Queen Elizabeth, which he declared to have been entertained by the English Catholics and approved by the pope. This assertion, to which the pope's letter of commendation gave some color, induced the king to give a partial assent to the plot in spite of Alba's urgent objections. But meanwhile the intrigue was discovered in England and the chief conspirators were brought to punishment. In December, 1874, on occasion of the Gladstone-Manning controversy, Lord Acton accused Pius V. of complicity in the contemplated assassination of Queen Elizabeth, while writers on the opposite side have labored to show that the pope merely approved of her being dethroned, but knew nothing of the plot against her life. Ridolfi, after the death of the duke of Norfolk and of Mary queen of Scots, continued his intrigues on the continent; but little is known of his subsequent career.

RIEDEL. **I. Friedrich Adolph von**, baron, a German general in the British service, born at Lauterbach in the grand duchy of Hesse, June 3, 1738, died in Brunswick, Jan. 6, 1800. He left his studies at Marburg to join the Hessian regiment in the British service, distinguished himself at the battle of Minden in 1759, and in 1776 was major general in command of the division of 4,000 Brunswickers which formed part of the German mercenary force employed by England in the American revolutionary war. Landing at Quebec June 1, he spent a year in Canada, exercising his men in the Indian mode of warfare. Having accompanied Burgoyne on his march to Albany, he rendered efficient service in the capture of Ticonderoga, and secured the British victory the day following at Hubbardton by bringing up reinforcements. In the first action at Saratoga, Sept. 19, 1777, by a timely forced march through the woods, he saved the army of Burgoyne from annihilation. After the second engagement, Oct. 7, he advised a retreat, and had his counsel been taken Burgoyne's escape into Canada might have been effected. After the surrender Riedesel accompanied his commander-in-chief to Albany. With the other German prisoners he reached Cambridge, Mass., Nov. 7, 1777, whence in the following year he was transferred to Virginia. On being exchanged in

the autumn of 1780, he was placed by Clinton in command of Long Island. In August, 1783, he returned to Germany. Having been made lieutenant general in 1787, he commanded the Brunswick contingent sent to Holland to support the cause of the stadtholder. At the time of his death he was commandant of the city of Brunswick. His "Letters and Military Journals in America," edited by Max von Eelking, has been translated by William L. Stone, with a memoir by the translator (2 vols. 8vo, Albany, 1868). **II. Friederike Charlotte Luise**, wife of the preceding, born in Brandenburg in 1746, died in Berlin, March 29, 1808. She was a daughter of the Prussian minister Masson, and was married at the age of 16. She followed her husband to America, joining him in Canada, and was his constant companion during his stay in this country. In her frequent correspondence with her mother her adventures were graphically and minutely described. These letters were published by her son-in-law Count Reuss, under the title of *Voyage de mission en Amérique, ou Lettres de Mme. de Riedesel* (Berlin, 1799; English by William L. Stone, 8vo, Albany, 1867).

RIEL, Louis. See MANITOBA, vol. xi., p. 114.

RIENZI, Nicola Gabrini, commonly called COLA DI RIENZI, "the last of the Roman tribunes," born in Rome about 1312, assassinated Oct. 8, 1354. He was a notary, but claimed illegitimate descent from the imperial house of Luxembourg, was well educated, of imposing presence, and gifted with extraordinary powers of eloquence. The removal of the papal see to Avignon in 1309 had left Rome a prey to contending factions of nobles, whose houses were fortified castles, and whose armed dependants kept the city in a constant turmoil. On the accession of Clement VI. in 1342, Rienzi was included in the deputation sent to Avignon to urge the pope to return to his see. Petrarch, who headed the deputation, conceived an admiration for Rienzi, to whom he afterward addressed the ode commencing *Spirto gentil*. The pope showed no disposition to revisit Rome, and Rienzi, despairing of any alleviation of the public calamities through the ecclesiastical power, and eager to lead the people to liberty, proceeded by flattering and deceiving the nobles to disarm their suspicions. He submitted to various kinds of indignity to advance his end, and imitating Brutus, in his own words, "made himself a simpleton and a stage player, and was by turns serious or silly, cunning, earnest, and timid, as the occasion required." On the day after Ash Wednesday, 1347, he caused a scroll to be affixed to the doors of the church of San Giorgio in Velabro, on which was inscribed: "Ere long Rome will return to her good estate." On the succeeding vigil of Pentecost the people were summoned to repair to the capitol on the following day. Rienzi passed the night in the church of Sant' Angelo, where he heard the thirty masses of the Holy Ghost, by whom he said

his acts were inspired, and at 10 in the morning issued forth in complete armor, bare-headed, and surrounded by 25 sworn confederates. By his side was the bishop of Orvieto, the pope's vicar, and he was followed by a guard of 100 men-at-arms. The procession, escorted by shouting multitudes of citizens, ascended the capitol, where the "laws of the good estate" were read to the people, providing for the public security in general. A guard was established for the protection of the citizens, and of the shipping and commerce on the Tiber; the right of the nobles to keep strongholds within the city was abolished; all places of defence were to be delivered to the delegates of the people; granaries were to be opened; the poor were assured of alms, and the magistrates were bound to administer justice according to law. The people adopted the constitution by acclamation, and Rienzi, being invested with power to establish the good estate, assumed the title of tribune in the following words: "Nicholas, by the grace of Jesus Christ, the severe and merciful, tribune of freedom, peace, and justice, the deliverer of the Roman republic." The nobles, awed by this sudden revolution, surrendered their fortresses, and gave in their submission. Embassies from Florence, Perugia, Siena, and many other cities of Italy were sent to Rome to congratulate Rienzi on his good work, and to offer substantial assistance; and several powerful Christian sovereigns paid him equal deference. He himself sent an embassy to the pope to ask his approbation; and as an evidence of his submissive reverence for the papal authority, he associated the bishop of Orvieto in office with him, taking care however that the honor should not be accompanied by any control of the affairs of government. Rienzi strove to augment his importance by processions, pageants, and public spectacles; spared nothing which would minister to his pomp and private luxury; and caused himself and his wife to be waited upon by the lords and ladies of his court. On Aug. 1 he was knighted in the Lateran church, and after the ceremony summoned all potentates, ecclesiastical or secular, who presumed to contest the prerogative of Rome to elect the emperor, to appear in the city at the ensuing Pentecost. On Aug. 15 he caused himself to be crowned in the church of Sta. Maria Maggiore with seven crowns, symbolizing the seven gifts of the Holy Ghost, under whose special influence he still claimed to act. His splendid processions gradually palled upon the public taste, and the populace began to murmur at the large expenditures from the public treasury to support the extravagance of their tribune. The nobles, whom he alternately threatened and caressed, finally banded together, and, having recovered several of their strongholds, appeared in arms before the city. By the imprudence of his enemies he gained a victory as surprising to himself as to others, and more than 20 of the

Colonnas, Orsinis, Savellis, and other noble families perished in battle or in flight. Instead of following up his advantage, he allowed his enemies to gather strength while he wasted his time in idle pageantries. The pope declared against him, and the people, alarmed by their rapidly increasing taxes, broke forth into open murmurs, which he was unable to quell, notwithstanding he restricted his extravagance and dropped his most ostentatious titles. At this juncture the freebooting count of Minorbino entered the city and fortified himself in one of the palaces of the Colonnas, whence he refused to retire when summoned by Rienzi. The latter called the armed citizens to his assistance, and, meeting with no response, solemnly abdicated his power, and took refuge in the castle of Sant' Angelo, Dec. 15, 1347, whence he escaped in the disguise of a monk. He took refuge among the Franciscans in the fastnesses of the southern Apennines, with whom he remained two years and a half as a tertiary of the order. During the jubilee celebrated in 1350 he is said to have appeared in the disguise of a pilgrim among the multitudes who flocked to Rome; and soon after, at the instigation, he tells us, of Fra Angelo, an inspired hermit, who informed him that the Father and the Son had ceased to rule in the world, and that the age of the Holy Ghost was at hand, he went to the court of Charles IV. at Prague, and exhorted him, in accordance with the prophecy of Fra Angelo, to undertake the conquest of Italy, in which he assured him none could be of so much service as himself. The emperor, amazed at the ambitious schemes and heretical doctrines of Rienzi, ordered him into custody, and finally sent him a prisoner to the pope at Avignon. A commission of ecclesiastics was appointed to try him, but their labors seem never to have been prosecuted with energy. Meanwhile Rome had returned to its former state of anarchy, and Innocent VI., the successor of Clement, determined, as a means of restoring the papal authority in the city, to send Rienzi thither. In the summer of 1354 he reentered Rome in the capacity of a senator, by the appointment of Cardinal Albornoz, the papal legate. Unwarned by adversity, he returned to his old pomp and luxury, and established an unmitigated tyranny. He was defied by the refractory Colonnas in their castle of Palestrina, against which he conducted a tedious and expensive but unavailing siege. The execution of Fra Moneale, a well known captain of a free company, from whose family he had received pecuniary assistance, and whose property he appropriated to his own use, filled the citizens with horror; and on his attempting to levy a fresh tax to pay his troops, a popular insurrection burst forth. Rienzi took refuge in the capitol, and, being deserted by his guards, appeared upon a balcony in armor, grasping the standard of the people, but was driven back by a shower of stones. Finally, in the disguise of a door-

keeper, he was arrested and led to the foot of the capitol stairs, where, while in the act of addressing the people, he was run through the body by Cecco del Vecchio, an artisan, and was forthwith despatched by a hundred weapons, his head cut off, and his body treated with shameful indignities.—An important series of letters, addressed by Rienzi to the emperor and the archbishop of Prague after his first fall, and vividly illustrating his character, was discovered by Pelzel, the historian of Bohemia, in the last century, and was in 1841 published in German by Dr. Papencordt, under the title of *Cola di Rienzi und seine Zeit* (Hamburg and Gotha). Some of them are given in Hobhouse's "Illustrations to Childe Harold." The story of Rienzi forms the groundwork of one of Bulwer's best known novels.

RIESENGBIRGE (Giant mountains), a range of mountains partly separating Prussian Silesia from Bohemia, and with the Lusatian range forming a continuation E. of the river Elbe to the Erzgebirge range W. of that river. The Riesengebirge belong to the N. W. division of the Sudetic mountain system, and pursue a S. E. course from the sources of the Bober to those of the southern Neisse until they are merged in the Glatzergebirge, of the Sudetic mountains proper. The range extends about 75 m., with a breadth of 30 m., and is of the same general geological structure with the Erzgebirge, the rocks being chiefly metamorphic slates and granites, and productive in a similar variety of valuable ores. Those of iron are especially abundant, and some of the earliest establishments for producing that metal were in this region. The highest summits are the Schneekoppe, which rises to an altitude of upward of 5,000 ft., and the Hohes Rad, and the Grosse and Kleine Sturmhaube, all of which are about 4,500 ft. high.

RIETSCHEL, Ernst Friedrich August, a German sculptor, born in Pulsnitz, Saxony, Dec. 15, 1804, died in Dresden, Feb. 21, 1861. He studied under Rauch and in Italy, settled in Dresden, and was appointed professor in the academy of fine arts. Among his works are a colossal group of "Mary weeping over the Body of Christ;" statues of Lessing, Goethe, Schiller, and Weber; "Love taming a Panther;" "Love borne by a Panther;" the "Four Hours of the Day;" and busts of Luther and Augustus II. of Poland and Saxony for the Walhalla.

RIFLE (Dan., *Rifle* or *Riffel*, a chamfer; Ger. *reifeln* or *riffeln*, to chamfer or groove), a term applied solely until within the past 25 years to small arms, the surfaces of whose bores are spirally grooved to increase the accuracy of their fire. Rifles are supposed to have been invented in the latter part of the 15th century, by Gaspard Zöllner of Vienna. They are known to have been used in target firing at Leipsic in 1498. The first rifles were made with their grooves parallel to the axis of the bore, and although no increased accuracy was

given to the fire by such grooving in theory, yet in practice the firing was better, because the grooves allowed the windage to be diminished, and formed receptacles for the residuum of the firing, which in smooth-bores lodged on the surface of the bore, causing wild shooting after a few discharges. The effect of spiral grooving was probably discovered accidentally, and the date of the discovery cannot be determined. In 1563 a law of the Swiss canton of Bern prohibited the use of arms with spiral rifling in target shooting, on account of the discord which such arms produced among the competitors. Some accounts name as the inventor Augustin Kutter of Nuremberg, who died in 1630. The advantages of rifling were first discussed scientifically in "New Principles of Gunnery" (1742), by Benjamin Robins, an English mathematician, who died in 1751. He mentions breech-loading arms as in use in Europe at that time.—That length in the direction of the bore in which the spiral rifling would make one turn is called the "twist," the parts cut out of the surface of the bore are the "grooves," and the spaces between the grooves are the "lands." The grooves are as nearly parallel to each other as they can be made, and generally have a constant inclination to the axis of the bore. In this case the twist is said to be uniform. There is another kind of twist, in which the groove starts from the breech parallel to the axis of the bore, and gradually inclines from this line until it attains the required angle, where it remains constant. This is called a "gaining twist." It is now only used in small pistols, and has little if any advantage over the uniform twist. The centres of gravity and of figure of a lead or iron ball do not generally coincide, and the diameter of the ball of a smooth-bore is necessarily smaller than that of the bore of the piece. It follows from the first fact that the line of direction of the force exerted upon the ball by the powder does not generally pass through its centre of gravity, causing a tendency to revolve about an axis passing through that centre, which axis will not coincide with the axis of the bore or the tangent to the trajectory, thus forming one source of deviation of the projectile from the theoretic trajectory. It follows from the second fact that the ball as it advances through the piece will bounce against the surface of the bore, causing a motion of rotation about some unknown axis; this is another source of deviation. If these sources of deviation be removed, the projectile will move in the theoretic trajectory, and will strike the point aimed at, if the other conditions to attain this end have been complied with. If a barrel be rifled, and the ball so made that projections on its surface precisely fit the grooves of the rifling, the ball in passing through the barrel must receive a motion of rotation about the axis of the bore; and as the axis of rotation will then nearly or quite coincide with the tangent to the trajectory du-

ring its flight, the sources of deviation above mentioned will have been removed. No account is here taken of the tendency of the axis of rotation to continue parallel to its original direction, which (as the path of the ball after it leaves the gun is a curve) gives some deviation from the desired point, as such a discussion involves an abstruse mathematical investigation. If a lead ball be pushed down the bore of a muzzle-loader until it reaches the powder, and then by some means be so expanded that the lead is squeezed into the grooves of the rifling, such a ball will receive in passing through the bore the required motion of rotation. In a breech-loader the lead ball is slightly larger than the bore, and the explosion of the powder upsets it, and forces the lead into the grooves, thus destroying all windage, and giving the necessary motion of rotation about the axis of the bore. Of two balls of the same weight projected from guns, it is evident that that one which presents the smaller surface to the direction of the motion will be less resisted by the air. Hence, other things being equal, the smaller the bore of the gun within practical limits, the less resistance is there to the motion of the ball, or in other words the further the ball will be carried, or technically the flatter will be the trajectory. Formerly the difficulty of loading pieces with small bores prevented the use of small calibres in military arms; but the general introduction of breech-loaders, in which small calibres can be loaded as easily and quickly as large ones, has caused the advantages of small calibres with cylindrical bullets to be recognized, and the calibres of all breech-loading military small arms manufactured within the past ten years range between .5 in. and .4 in. The great majority range between .45 in. and .4 in. It has been mathematically determined that the larger and denser the projectile, the less in proportion is the resistance of the air. It follows therefore that for the same calibre an oblong projectile is less retarded than a spherical one, and that for the same initial velocity the oblong projectile will have a greater range than the spherical one. It has also been mathematically determined that the length of trajectory of a projectile, in which the velocity is reduced by any definite amount, is directly proportional to the product of the diameter and density of the projectile, and inversely proportional to the density of the air. Hence greater ranges are obtained by the use of large and heavy projectiles, in preference to small and light ones, solid shot instead of shells; lead instead of any lighter metal, and long instead of short projectiles. These principles have all been applied in the manufacture of modern rifled small arms; but it is only within the past 30 years that the rifle has come into general use as a military weapon.—Various styles of rifling have been used in the manufacture of military arms, the difference being in the number and shapes of the

grooves and the lengths of the twists. But in general, the grooves are flat, in number from three to seven, and the breadth of the lands less than that of the grooves. In muzzle-loaders the depth of the grooves diminishes from the breech to the muzzle, but in breech-loaders that depth is constant. In muzzle-loaders too, as a very great range was not considered attainable, the twist was gentler than it is in breech-loaders. In the former the twist

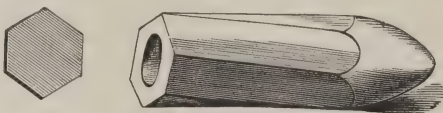


FIG. 1.—Whitworth's Small-arm Projectile.

was generally one turn in 60 in. or more; in the latter it is usually one turn in 22 in., and in some arms it is a little greater than that. The intensity of the twist is limited by the danger of causing the ball to "strip" in passing through the bore. About 5 per cent. of the force of the powder is taken up in generating the enormous velocity of rotation made necessary to attain the long ranges of modern arms. Whitworth's rifling consisted in making the bore of the barrel hexagonal in section, with rounded angles, and giving the bore a twist. The effect of this was good, but the difficulty of its manufacture, or rather the ease of manufacture of the cylindrical bore, has caused its general rejection in military small arms. Henry's rifling, which was adopted by the British government for all its small arms, has produced excellent results. Although the section looks as if it might be difficult to bore

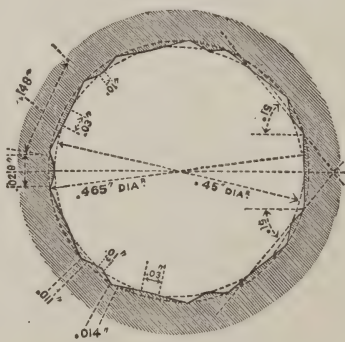


FIG. 2.—Henry's Rifling.

it correctly, yet, on account of the peculiar arrangement of grooves, it is no more difficult to make than ordinary rifling.—As small arms became lighter and of more general use in armies, the necessity for a light arm of long range for the use of light troops, sharpshooters, &c., became more apparent. The fire of the ordinary musket or arquebus was too wild for such troops, and the rifle came gradually into use, but the slowness of its fire

prevented its general adoption. In Germany, during the thirty years' war, organized companies of riflemen were used with advantage by William V., landgrave of Hesse-Cassel. In 1645 three regiments were organized in Bavaria, and in 1674 the elector Frederick William of Brandenburg had riflemen distributed among his infantry regiments. In 1740 Frederick the Great organized a small body of light infantry of 60 men armed with rifles, which finally grew into a regiment. France also early made use of sharpshooters or riflemen. In 1689 a French organization existed in which the men were armed with two pistols, a sword, and a rifle called *escopette*. But the rifle, on account of the difficulties in its manipulation, did not grow in favor, and at the commencement of the French revolution no rifle regiments or companies existed in France. The Swiss and Austrians paid much attention to their military rifle organizations during the last half of the 18th century, being forced into that direction by the passionate fondness for the arm which existed in the Swiss mountains and in Tyrol. During the war of the American revolution the Americans, who were obliged to bring every weapon into requisition, made excellent use of their hunting rifles, and were really the first sharpshooters. The British, taught by their dearly bought experience, adopted rifles as an important part of their armament in 1794. Rifled carbines are mentioned in Smith's "Military Dictionary" (1779) as arms "used by the hunters or light infantry." In the new organization the left flank company of each battalion of ten companies was composed of light infantry or riflemen, and received special instruction, the right flank company being grenadiers. The French about the same time (1792), following the same example, introduced new model rifles into their infantry and cavalry armaments. Their accuracy for short ranges was superior to that of the musket; but the shortness of the range, the slowness of loading, the necessity for a peculiar patched ball and for using a mallet, and the fact that no bayonets were used with them, soon caused their abandonment. The consequence was that under Napoleon I. rifles were little used in the French army. But although Napoleon had a low opinion of the rifle as it existed in his day, he had great faith in the improvement of the musket. He therefore designated Col. Pauly at Paris to improve the musket, who in 1812 patented in France what has since been known as the Pauly gun. The cartridge in this gun contained its own means of ignition. In Pauly's shop Dreyse worked. Pauly's gun having been thrown aside on account of its alleged want of simplicity, Dreyse worked on in the direction of the bolt gun, and in 1836 made the first breech-loading needle gun. As Pauly's was the parent gun of all breech-loaders which close the breech with a swinging block, so Dreyse's needle gun is the parent of all breech-

loaders which close the breech with a bolt. In 1826 Lieut. Delvigne of the French artillery invented a rifle with a chamber smaller than the bore. The chamber was connected with the bore by a spherical surface of the

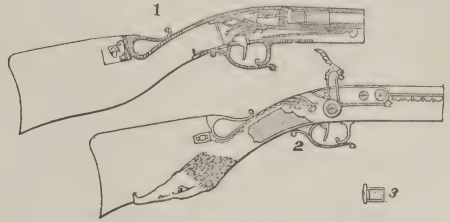


Fig. 8.—Pauly Breech-loader. 1. Vertical section. 2. Elevation. 3. Cartridge.

same radius as that of the ball. The powder having been poured into the chamber from the muzzle, the ball was dropped into the bore, and rested on the top of the chamber. A few blows of the ramrod, with its head hollowed to fit the bullet, squeezed the lead into the rifling grooves without disturbing the powder, and when the piece was fired it was found that the range and accuracy were materially increased, an effect due to the rifling. This idea of Delvigne's, viz., getting the ball to its place on top of the powder in the chamber without other force than its own weight, and then causing it to take the rifling by the action of ramming, was the mother idea of all improvements in muzzle-loading military rifles from that time onward, and in fact may be said to be the first step in modern improvements of rifles. In 1842 France armed ten battalions of chasseurs with rifles made on Delvigne's principle, and at the same time instituted the school of firing for the purpose of educating sharpshooters. This school has been imitated by nearly all other nations. The cartridge for Delvigne's arm was special, and

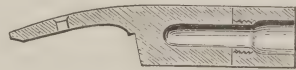


Fig. 4.—Breech of Delvigne's Rifle (1842).

therefore objectionable; hence Col. Thouvenin invented the *carabine à tige*, in which the bore is of the same diameter from the muzzle to the breech. From the breech projects into the bore a steel rod about $\frac{1}{4}$ in. in diameter, the axis of which is coincident with that of the bore, and its length such that the front end of the rod reaches to the top of the powder charge. The rifle was loaded precisely as was the old musket. The middle part of the ball rested on the front end of the rod, and a few blows of the ramrod squeezed the lead into the rifling. This rifle made a good target at 500 yards. The next step in the improvement of rifled small arms was the introduction of the elongated projectile of Capt. Minié about 1845.

The *carabine à tige* was still used, but the rifling was made more abrupt, having a twist of $6\frac{1}{2}$ ft. instead of 20 ft., an increase necessary on account of the greater weight of the new projectile, and the greater range attained. The rod at the breech (*tige*) was left out. Ranges



FIG. 5.—Breech of Carabine à tige (1846).

of more than 1,300 yards were obtained, and accurate shooting was done at ranges of 900 yards. Grooves had been made in the rear part of the bullet to hold the lubricant. In order to simplify the shape of the ball these grooves were afterward left off; but the shooting was materially diminished in accuracy by the omission, and the experiment showed that such grooves made the very resistance which was necessary to keep the axis of the long projectile coincident with the tangent of the trajectory through its flight; or in other words, they kept the bullet from turning end over end. About 1849 Capt. Minié invented a bullet which had in its rear a recess of a truncated conical form lined with a tin cup something like a small thimble. This recess made the sides of the bullet thin, so that the effect of firing the charge was to press the tin cup into the bullet, forcing the lead into



FIG. 6.
Minié's First
Bullet.



FIG. 7.
Minié's Bullet
of 1849.

the grooves of the rifling. This invention caused the abandonment of the rod in the *carabine à tige*, and gave an impetus to the introduction of rifles into all European armies, so that by 1855 the infantry firearm in those armies was the rifle; the old smooth-bore mus-

kets were rifled, and used the Minié bullet, becoming rifles in all respects, and retaining the ease of loading of the smooth-bore. The United States had for 30 years before that time kept a small supply of military rifles, manufactured at the Harper's Ferry armory. Their calibre was $\cdot54$ in., and their weight about $9\frac{1}{2}$ lbs. The rifling was in three grooves, each $\cdot36$ in. broad, with a constant twist, making one turn in 10 ft. The depth of the grooves was $\cdot005$ in. at the muzzle and $\cdot008$ in. at the breech. The ball, which was spherical and patched, weighed $\frac{1}{2}$ oz. or 220 grs., and the powder charge weighed 75 grs. These rifles were used in some frontier campaigns, and by a few regiments in the Mexican war. They were altered about 1855 by increasing the calibre to $\cdot58$ in., and by making the grooves $\cdot3$ in. broad, $\cdot005$ in. deep at the muzzle, and $\cdot013$ in. deep at the breech. In 1855 the United States adopted a new model rifle musket, which has been known since as the Springfield rifle. The calibre was $\cdot58$ in., and the weight with bayonet about 10 lbs.

The rifling was in three grooves, each $\cdot3$ in. wide, $\cdot005$ in. deep at the muzzle, and $\cdot015$ in. deep at the breech. The twist was uniform, making one turn in 6 ft. The bullet was cylindrical-conical with expanding base, and weighed 500 grs. The powder charge weighed 60 grs. From this date the rifle became the infantry arm of the United States, although the suddenness of the outbreak of the civil war of 1861-'5 made it necessary to bring into use all the small arms then belonging to the United States, smooth-bores as well as rifles.—All attempts to improve muzzle-loading small arms may be considered to have ceased after 1861, the fact that breech-loaders were soon to supersede them as infantry arms having become apparent to all military authorities. In 1814 Pauly's invention was examined by a commission of which Brillat-Savarin was president, and an exhaustive series of experiments was made. The commission reported that troops armed with these guns would have a very great advantage over an enemy armed with muzzle-loaders, because the Pauly guns could be loaded and fired without slackening the march; that they could be fired more rapidly than muzzle-loaders, would carry further, and required less powder; that rain or dampness would not affect the fire; that they never hung fire; that the charge was easily withdrawn; that a ramrod was not required; and that, other things being equal, the range was greater than that of a muzzle-loader. Add to these the further advantage that they could be loaded while the soldier was lying down, and we have all the merits claimed for the breech-loaders of the present day. But Europe was at that time exhausted with the wars of Napoleon, and little attention was given to the invention. About 1811 a breech-loading rifle was invented in the United States by John H. Hall, and after trial at the Washington arsenal and at Fortress Monroe in 1818-'19, a large number were ordered to be made at the Harper's Ferry armory. They were manufactured there under the direction of the inventor, who first introduced the system of making the parts of the arm interchangeable, and was the first or among the first to use the drop-hammer for stamping out the parts by one or two blows. Carbines were made after the same invention, which were used by the mounted troops of the United States until about the time of the Mexican war. Although these rifles were very strong shooters, there were some elements of danger about them, and they never were favorites with the troops. This is the first instance of the successful introduction of a breech-loader into a military service. The Hall rifle was made to use both the flint and the percussion locks. Taking an ordinary muzzle-loader, and cutting the barrel in two about 6 in. or less in front of the breech, and arranging the rear piece on a hinge or trunnions so that it may be raised high enough to expose the bore, we have nearly the Hall rifle. This movable piece could be

clamped so that its bore and that of the barrel were coincident, and it made the chamber. To load the piece, the front end of the chamber

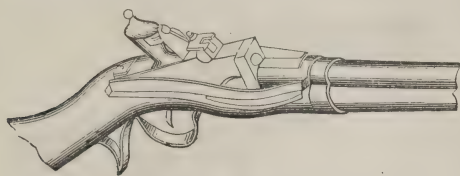


FIG. 8.—Hall's Rifle.

was thrown up by a trigger under the stock. The cartridge was then inserted, the chamber pressed back to its place, where it was held by a trigger and spring, and after priming or capping, the piece was ready for firing. A breech-loading rifle was invented in Norway about 1838, and between 1839 and 1845 extensive preparations were made with it by the government of Sweden, resulting in the conclusion that it was superior in all respects to muzzle-loading arms.—In 1841 Prussia decided to arm the troops with the *Zündnadelgewehr* or needle gun, and in the course of a few years its whole army was furnished with this arm. Its first uses in actual service were in the revolution of 1848 and the first Schleswig-Holstein war, where its superiority to the muzzle-loader was demonstrated. The decisive Prussian victory of Sadowa in the Austrian war of 1866 was at first attributed wholly to the fact that the Prussians had the needle gun, while the Austrians had only muzzle-loaders; and a great impetus was given to the introduction of breech-loaders in all European armies. In France a needle gun was adopted which was

a bolt to which is attached a handle which acts in keeping the breech closed, precisely as does the handle of a door bolt in keeping the bolt in place when it is shot. The bolt traverses forward and back in an iron receiver which is screwed to the barrel. The lock and needle are enclosed in the bolt. The spring, like that in nearly all bolt guns, is of spiral steel wire. Supposing the piece unloaded, to load it, the needle is pulled back by the thumb piece in rear; then the handle is turned to the left, the bolt withdrawn, and the cartridge inserted. The bolt is pushed forward, the handle turned to the right against its stop in the receiver, and after cocking by pushing forward the thumb piece, it is ready for firing. The fulminate is just in rear of the wad at the base of the bullet, so that the needle passes through the whole powder charge before it strikes the fulminate. The cartridge envelope is papier maché. The calibre of the rifle is about .6 in.,

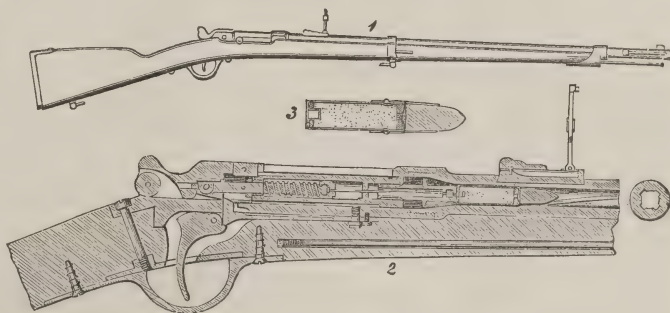


FIG. 10.—French Chassepot.

1. Gun complete. 2. Section showing lock and rifling of gun ready to fire.
3. Cartridge.

and the number of grooves is four. There is a great leak of gas from this rifle. The gas check is made by the contact between the bolt and the rear part of the chamber, and is not sufficient, particularly as this contact becomes more imperfect as the gun is used. In the Chassepot, or French military rifle, the breech action is in several respects like that

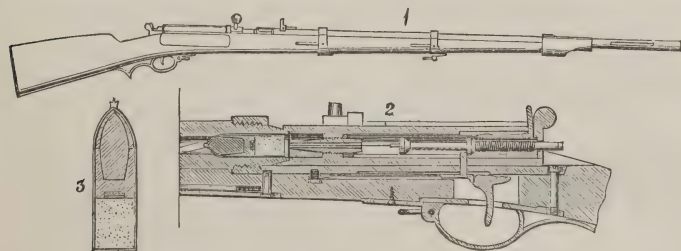


FIG. 9.—Prussian Needle Gun.

1. Gun complete. 2. Section showing working parts of lock, gun ready to fire.
3. Cartridge.

in all respects an improvement on that of the Prussians, called the Chassepot after the inventor. The needle-gun breech action consists of

of the preceding, having a bolt handle by which the bolt is held in place, the latter containing the lock and needle. The fulminate is in a paper wad which forms the rear of the cartridge envelope. The gas check is a cylindrical India rubber, which is pressed against the surface of the chamber when the explosion takes place, and theoretically forms an efficient obstacle to the passage of the gas. The cartridge envelope is silk or linen, and the calibre is .433 in. (11 millimetres). The num-

ber of grooves is four. These are the two principal breech-loaders in use which do not employ the metallic envelope cartridge, and it is notable that the greatest war of modern times was fought with these two arms, metallic cartridge arms having been scarcely used in any of its great battles.—The civil war in the United States stimulated the invention of breech-loading arms. Nearly all of these used the metallic cartridge, and some displayed great inventive talent. Shortly before the war several breech-loaders were tested by the United States which used the detached percussion cap. Among these are the Burnside, Cosmopolitan, Gallagher, Joslyn, Merrill, Maynard, Smith,

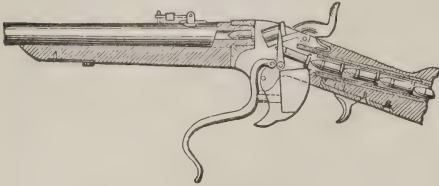


FIG. 11.—Spencer Magazine Gun.

Lindner, and Sharps. The last named has been altered to use the metallic cartridge, and is still in use. The others have generally been discarded, and are not in use as military arms. During the civil war the Spencer rifle, a magazine gun, was introduced, and was extensively used by the Union cavalry. It contains a magazine in the butt of the stock, holding seven cartridges, and by the movement of the trigger guard used as a lever the cartridges are admitted to the chamber one by one. The same movement ejects the shell of the exploded cartridge. When the magazine is exhausted, it can be replaced by another, or be reloaded, or the rifle may be used as a single breech-loader, the magazine being previously shut off. In the Henry gun, an American invention, the magazine is under the barrel, and parallel to it.



FIG. 12.—Winchester Repeating Arm.

It contains 17 metallic-cased cartridges, which can be brought successively into the chamber by moving the lever under the stock. It can

also be used as a single breech-loader by shutting off the magazine. This gun has been altered by O. F. Winchester, and is now called

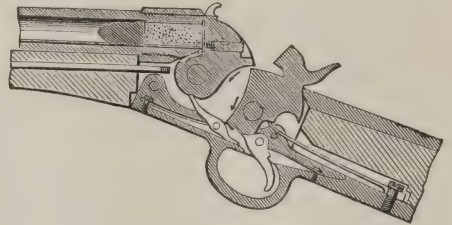


FIG. 13.—Remington Rim-fire Rifle.

the Winchester gun. The Ball, Fogarty, and Gardner guns are also magazine guns. The Remington gun is a single breech-loader using metallic-cased cartridges. An iron receiver made to correspond externally to the shape of a gunstock is screwed to the breech of the barrel; in this are contained the breech block and lock. Supposing the piece to have been discharged, it is loaded as follows: 1, it is cocked; 2, the breech block is pulled back by the handle at its right side, ejecting the shell of the exploded cartridge; 3, the cartridge is inserted; 4, the breech block is pushed back to its place, closing the breech. The gun is then ready for firing. The hammer has a pro-

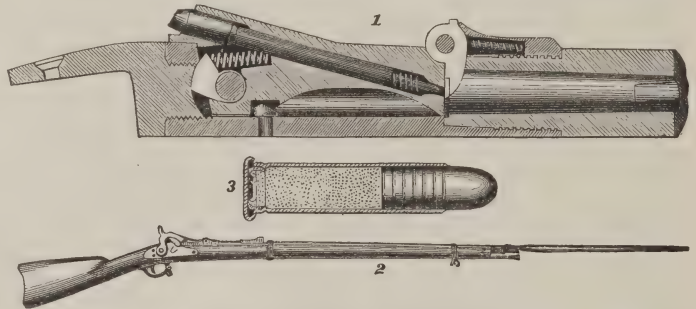


FIG. 14.—Springfield Breech-loader.

1. Vertical Section of Breech-loading System. 2. Gun complete. 3. Cartridge.

jection which passes under the breech block when it is down, or closing the breech, and prevents the block from flying back when the explosion takes place. The firing pin passes through the breech block from the nose of the hammer to the percussion cap in the base of the cartridge shell. This rifle is used by the United States navy, and has been adopted by Egypt, Spain, and some other nations. It has various calibres and riflings, and is arranged for rim-fire and central-fire cartridges. The Springfield breech-loader, which has been adopted by the United States for the army and militia, is in external appearance like the Springfield muzzle-loader, having nearly the same stock and side lock. The breech action consists of a receiver screwed to the breech of the barrel, and a breech block which when it

closes the breech lies in the receiver. To open the breech, the breech block moves upward and forward about a hinge in its front and on top of the barrel. The movement of the hinge in opening the breech block ejects the shell of the exploded cartridge by a combined cam and spring. In the rear of the breech block is a cam with an eccentric handle used for lifting the block, and so arranged that unless the block is closed the hammer cannot strike the firing pin, but will merely strike the handle. The firing pin goes through the breech block in an inclined direction from the nose of the hammer at the side to the centre of the rear of the chamber, where it strikes the head of the cartridge, exploding the fulminate when its rear end is struck by the hammer. This rifle was selected by a board of officers of the army in 1873 from about 100 competitors. Its calibre is .45 in., and it has three grooves equal in width to the lands, and a twist of 22 in.—

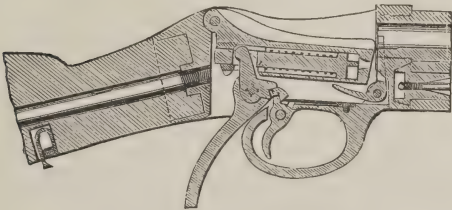


FIG. 15.—Martini-Henry Gun.

The rifle adopted for the military service by the British government is the Martini-Henry, in which the breech action is the invention of Martini, and the rifling that of Henry (not the inventor of the Henry gun), which has already been described. The Martini breech action appears to have been taken from the Peabody gun, an American invention. In the latter the breech block revolves about an axis at its rear end, and the front end falls to open the breech. In the act of falling it moves a bent lever which ejects the shell. The motion of the breech block in the Martini is the same as that in the Peabody; but the Martini breech block contains the lock, differing in this respect from the Peabody, in which the ordinary

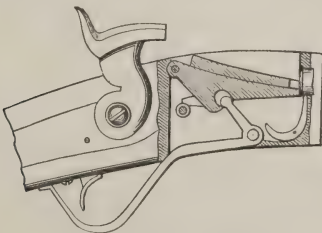


FIG. 16.—Peabody Rifle.

side lock is used. Turkey has adopted the Martini-Henry gun. The calibre of this rifle is .45 in., the rifling the Henry, with seven grooves.

The twist is 22 in. The first step made by the British government in the direction of breech-loading small arms was in the alteration of the

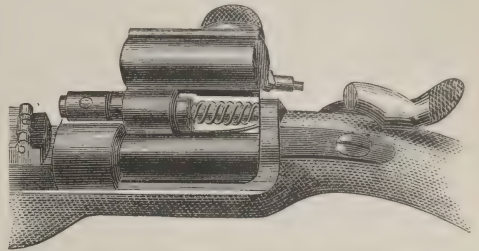


FIG. 17.—Snider Breech Action Rifle.

Enfield muzzle-loader to the breech-loading system by the Snider plan, about 1866. The breech block in this system revolves about an axis parallel to the axis of the bore, and at its right. The firing pin passes obliquely from the nose of the hammer through the breech block to the centre of the base of the cartridge. In 1869 Russia ordered from the United States 30,000 metallic-cartridge rifles, consisting of a combination of the Springfield breech-loader and a spiral spring lock. This was the first movement in arming an enormous army like that of Russia with metallic-cartridge arms. The questions of the kind of cartridge and diameter of bore and rifling were carefully studied by the Russian officers in the United States under Maj. Gen. Gorloff, and their results were adopted by the Russian government. The calibre adopted was .42 in.; the ball



FIG. 18.—Gorloff Russian Breech-loader.

weighed 380 grs., the powder 77 grs.; and the cartridge case was brass, central fire. There were six grooves, each .175 in. broad, and the twist was 22 in. Major Pieri of the French army has adopted the same calibre in a breech-loading rifle lately invented by him. In this arm the rifling is peculiar, and there is no trigger nor trigger guard on the lower side of the stock. The rifle is fired by touching a thumb piece on the upper side of the stock, behind the breech action. In other respects it is similar to the Chassepot. Afterward Russia adopted in place of the Gorloff a bolt gun which takes the same cartridge, the invention of the American Col. Hiram Berdan. Since the Franco-German war, Germany has changed her needle gun, with paper or linen

envelope cartridges, for another with calibre .433 in., using a metallic-shell cartridge; and France has commenced the introduction of an altered form of the Chassepot which will make it available for use with the metallic cartridge. It may be said therefore that all civilized nations are now using breech-loading, metallic-cartridge arms.

TABLE SHOWING THE VARIETIES OF BREECH-LOADING RIFLES USED IN THE MILITARY SERVICES OF THE NATIONS NAMED.

NAME OF NATION.	NAME OF RIFLE.	DESCRIPTION OF BREECH ACTION.	Shots per minute.	Weight of cartridge, gra.	Weight of rifle without bayonet, lbs.	Range, yards.	Calibre, inches.	REMARKS.
Great Britain and Turkey.....	Martini-Henry	{ Block opens breech by falling at forward end.....	12	582	9.32	1,200	.45	Sweden and Denmark have the Remington rifle in their services experimentally.
Austria.....	Werndl.....	{ Block opens breech by turning around axis of bore.....	9	502	8.98	1,000?	.40	
Bavaria.....	Werder.....	{ Falling breech block.....	11	548	9.71	900	...	
Belgium.....	Albini.....	{ Breech block opens upward and forward.....	7	625	9.81433	Changed to metallic cartridge. Changed to metallic cartridge, calibre .433 inch.
Holland.....	Beaumont.....	{ <i>Système à broche</i>	12	527	9.59	1,200	....
Italy.....	Carcano.....	{ Transformed arm, needle system.....	8	642	10.21	600	....
France.....	Chassepot.....	{ Needle system.....	12	502	8.9	1,200	.433	Changed to metallic cartridge. Changed to metallic cartridge, calibre .433 inch.
Prussia.....	Dreyse.....	{ Needle system.....	5	625	11.47	600	.60	
Russia.....	Karl.....	{ Transformed arm, needle system.....	7	669	10.54	900	.60	
".....	Gorloff.....	{ Block lifting upward and forward.....	8	598	9.06	1,000	.42	Egypt and Spain....
Egypt and Spain....	Remington....	{ Block falling down and backward.....	10	600	9.5	1,000	.433	
United States army and militia.....	Springfield....	{ Block moving upward and forward.....	12	611	9.13	1,000	.45	
United States navy..	Remington....	{	10	585	9.25	800	.50	

The extreme accurate range of military breech-loading rifles now in use by nearly all nations is about 1,000 yards. An expert shot will strike a man at this distance three times out of four. It is claimed for the Russian rifle described above, that an expert will place every bullet within a space 3 ft. high by $1\frac{1}{2}$ ft. broad at 1,000 yards distance. The range of magazine or repeating rifles does not in general exceed 500 yards. In order to place a large number of charges in the magazine, the charge is kept small, in some degree sacrificing range to rapidity of fire. The range of rifled pistols is about 100 yards. Thirty years ago the range of the musket, which was the infantry arm in use in all armies, was 200 yards, and the tactics of the three arms, infantry, cavalry, and artillery, dimensions of forts, &c., were all determined upon that basis. It is evident that the great increase of range due to the present style of breech-loading weapons must materially increase the distances at which the fire of hostile bodies of infantry becomes deadly, and must therefore involve a radical change in tactics. This change is now a subject of discussion among the most accomplished soldiers, but has not yet been determined.—See Robins, "New Principles of Gunnery" (London, 1742); Thiroux, *Instruction théorique et pratique d'artillerie* (Paris, 1842); Roret, *Manuel de l'armurier* (1852); Chesney, "Observations on Fire-arms" (London, 1852); Wilcox, "Rifles and Rifle Practice" (New York, 1859); L'Haridon, *Catalogue du musée d'artillerie* (Paris, 1864); Greener, "Modern Breech-loaders" (London, 1870); Favé, *Études sur le passé et l'avenir de*

l'artillerie (Paris, 1871); Mattenheimer, *Die Rückladungsgewehre* (Darmstadt and Leipsic, 1872); and Wingate, "Manual for Rifle Practice" (New York, 1875). (For rifled cannon, see ARTILLERY, and CANNON.)

RIGA, a city of Russia, capital of Livonia, on the right bank of the Dvina, about 8 m. from the gulf of Riga, and 300 m. S. W. of St. Petersburg; pop. in 1867, 102,043, of whom 47,000 were Germans, 25,000 Russians, and the rest chiefly Letts. It is the seat of the authorities of the Baltic provinces, and next to St. Petersburg and Odessa the greatest commercial emporium of Russia. The walls of the city were in 1857 converted into promenades; the citadel was razed in 1867, and no fortifications remain excepting Fort Dünamünde for the protection of the harbor. There are three suburbs: the Moscow suburb, inhabited chiefly by Russians; the St. Petersburg, by Germans; and the Mitau suburb. St. Peter's, the principal of the nine Lutheran churches, has a tower 470 ft. high, and there are four Greek and several other churches and a synagogue. There are two gymnasiums, a new polytechnic institute and school of navigation, and various other schools, and a conservatory of music was established in 1875. One of the finest public buildings is the exchange. The arrivals of vessels in 1873 were 3,177, and the departures 3,181. The imports amounted to 19,611,660 rubles, including coal, salt, iron, and miscellaneous articles; the exports to 20,153,453 rubles, consisting chiefly of flax, hemp, timber, grain, and tobacco. The registered shipping is about 100 vessels, about one fourth

steamers. There are in Riga and vicinity nearly 100 manufactories of woollen, cotton, and other goods, and many ships are built.—The city was founded in 1201 by the Livonian bishop Albert von Apeldern, who here established the order of knights sword-bearers, which in 1237 united with that of the Teutonic knights, and the latter for a considerable time wielded supreme authority together with the see of Riga, which was early raised to the dignity of an archbishopric. The city, however, paid but limited obedience to its rulers, having grown prosperous and become a member of the Hanseatic league. The last of the archbishops, the margrave William of Brandenburg, favored the reformation, which had been introduced under his predecessor (about 1530). The city was subsequently a protectorate of Poland, excepting from 1561 to 1581, when it was free. In 1621 it was conquered by the Swedes, and in 1710 by Russia, but without losing any of its ancient privileges.

RIGDON, Sidney. See MORMONS, vol. xi., p. 833.

RIGG, James H., an English clergyman, born in Newcastle-upon-Tyne in 1821. He entered the Wesleyan ministry in 1845, and soon exerted great influence. In 1852 he published a series of papers entitled "Wesleyan Connectionalism and Congregational Independency Contrasted," and was appointed editor of the "London Quarterly Review," the Wesleyan organ; some of his contributions to which were collected under the title "Modern Anglican Theology" (8vo, 1857). Since 1868 he has been principal of the Wesleyan normal college at Westminster, and since 1870 a member of the London school board. He was a delegate to the conference of the evangelical alliance in New York in 1873, and has received the degree of D. D. from Dickinson college, Pa. His principal works are: "The Sabbath and the Sabbath Law, before and after Christ;" "The Relations of Wesley and Wesleyan Methodism to the Church of England;" "Wesley's Character and Opinions in Early Life;" "John Wesley in Mature and Later Life;" "Essays for the Times" (8vo, 1866); and "National Education in its Social Conditions and Aspects, and Public Elementary School Education, English and Foreign" (8vo, 1873).

RIGHINI, Vincenzo, an Italian composer, born in Bologna, Jan. 22, 1756, died there, Aug. 19, 1812. He studied counterpoint under Martini, and commenced as a singer at Parma; but his reputation as a composer soon surpassed that as a vocalist, and after three years at Prague he entered the service of Joseph II. at Vienna, remaining eight years. He was afterward successively chapelmaster to the elector of Mentz, and director of music at the royal theatre in Berlin. He composed 20 operas, mostly on classical subjects, and one entitled *Don Giovanni, ossia il convitato di pietra*, having a libretto similar to that afterward used by Mozart. He also wrote many arias and

cantatas, a *messe solennelle*, and some instrumental works. His operas have fallen into disuse, but many of their arias are still sung.

RIGI, or **Righi**, an isolated mountain of Switzerland, in the canton of Schwytz, between the lakes of Zug and Lucerne. The highest point, the Rigi Kulm, is 5,902 ft. above the sea, or about 4,500 ft. above the lake of Lucerne. The view from this summit is one of the most extensive in the Alps, embracing most of E. and N. Switzerland and the Jura mountains, and extending far into Swabia. There are numerous hotels and sanitariums on the mountain, which attract as many as 40,000 visitors annually. The summit is accessible by roads from various points at the base. In 1873 a railway on the plan of the one at Mt. Washington, N. H., was completed to the Rigi Kulm. It starts from Vitznau, on Lake Lucerne, on the S. side of the mountain, and its grades range from 7 to about 30 in 100.

RILEY, a N. E. county of Kansas, bounded E. by the Big Blue river, and S. and S. W. by the Kansas and Republican rivers; area, 654 sq. m.; pop. in 1870, 5,105. The Kansas Pacific railroad passes along the S. border. The surface is diversified and the soil fertile. Limestone and sandstone are found. The chief productions in 1870 were 78,166 bushels of wheat, 405,277 of Indian corn, 57,730 of oats, 43,086 of potatoes, 111,590 lbs. of butter, and 15,740 tons of hay. There were 2,299 horses, 2,192 milch cows, 4,458 other cattle, 2,190 sheep, and 1,758 swine; 1 flour mill, 3 saw mills, 2 breweries, 3 manufactories of saddlery and harness, and 3 of tin, copper, and sheet-iron ware. Capital, Manhattan.

RILEY, Charles Valentine, an American entomologist, born in London, England, Sept. 18, 1843. At 17 he came to America, and after farming for three years was for nearly five years editor of the entomological department of the "Prairie Farmer" at Chicago. In 1868 he was made state entomologist of Missouri, and has since then made annual reports on its insects. In the same year he began with Benjamin D. Walsh, state entomologist of Illinois, the "American Entomologist," a monthly magazine. Among the more noteworthy results of his labors are the tracing of the history of the Colorado potato beetle (1863); the discovery of a 13-year brood of the 17-year or periodical cicada (1868); the discovery of the grape *phylloxera* in American vines, and of its identity with the destructive insect of southern France (see PHYLLOXERA); the recommendation to use diluted Paris green against the Colorado potato beetle (1871) and the cotton worm (1873); and the discovery of the yucca moth (*pronuba yuccasella*), by which the North American yuccas are fertilized. In 1873 he was presented with a grand gold medal by the French minister of agriculture and commerce "for services rendered to French grape culture."

RIMINI (anc. *Ariminum*), a town of central Italy, at the mouth of the Marecchia in the

Adriatic, in the province and 30 m. S. E. of the city of Forlì, with which it is connected by railway; pop. in 1872, 33,886. It contains celebrated antiquities, especially a bridge of the finest white marble built under Augustus and Tiberius at the junction of the Via Flaminia and Via Æmilia. The church of San Francesco is of remarkable architecture, and was built by Pandolfo Malatesta, whose family were the local rulers from the beginning of the 13th century to the beginning of the 16th. Rimini possesses one of the largest and finest theatres of Italy.—See *Storia Riminese*, by Tonini (2 vols., Rimini, 1860).

RIMOUSKI, an E. county of Quebec, Canada, bounded N. W. by the St. Lawrence river, near its mouth; area, 4,932 sq. m.; pop. in 1871, 27,418, of whom 25,957 were of French and 880 of Scotch origin or descent. It is watered by streams flowing into the St. Lawrence and into the Restigouche river and bay of Chaleurs, and is traversed by the Intercolonial railway. Capital, Rimouski.

RINDERPEST. See MURRAIN.

RINEHART, William Henry, an American sculptor, born in Frederick co., Md., Sept. 13, 1825, died in Rome, Italy, Oct. 28, 1874. He was apprenticed to a stone cutter, attended the night school of design of the Maryland institute in Baltimore, became foreman of the establishment in which he was employed, and was noted for his fine monumental and mantel work. Opening a small studio, he devoted his leisure hours to modelling, and executed one of his earliest works, "The Woodman." He was in Florence from 1855 to 1858, and on his return to Baltimore brought his bass reliefs "Night" and "Morning." He established a studio there, but soon afterward went to Rome, where he resided till his death. He completed the double bronze door in the capitol at Washington, left unfinished by Crawford. His best works are a "Nymph," "Woman of Samaria," "Indian Maiden," "Rebecca," "Endymion," "Atalanta," "Hero," "Leander," "Antigone," and "Latona." His masterpiece, "Clytie," is in the Peabody institute, Baltimore; his statue in bronze of Roger B. Taney is at Annapolis. He executed more than 100 portrait busts.

RING (Ang. Sax. *hring*), a circular ornament worn on the finger. The finger ring has been more intimately associated with the most important interests of life than any other ornament. In ancient times it was a symbol of authority, and power was delegated by means of it. When "Pharaoh took off his ring from his hand, and put it upon Joseph's hand," he intrusted to him the government of Egypt. Ahasuerus gave his ring to Haman as his warrant for exterminating the Jews; and when he ordered Mordecai to write letters annulling the decree, he took the ring from Haman and gave it to him to seal them with. Signet rings and rings for ornament were worn by all classes of the ancient Egyptians. Many

gold ones have been found in the tombs, and some of silver and of bronze, the latter mostly signet rings. Those worn by the lower classes were usually of ivory or of blue porcelain. The favorite rings of the rich were plain circlets of gold, bearing either a scarabæus or a stone engraved with the name of some deity or king, or with a sacred emblem and legend. Frequently many were worn, sometimes two or three on each finger and on the thumbs. Among the Hebrews the signet ring was an indispensable article of dress, and was perhaps handed down from father to son as a mark of rank and authority (Luke xv. 22). The Hebrew ladies wore rings adorned with precious stones, valuing most those set with rubies, emeralds, and chrysolites. As Homer makes no mention of rings, they are supposed to have been introduced into Greece from Asia subsequent to his time. In the days of Solon every freeman wore a signet ring of gold, silver, or bronze, and it does not appear that the right was ever restricted to any class of the Athenians. At a later period rings were set with precious stones, and were worn as ornaments, some persons displaying several on each hand. Women wore ivory and amber rings. Among the Lacedæmonians only did the law attempt to repress the luxury of wearing gold and jewelled rings, and every Spartan took pride in the use of a plain iron ring.—According to Pliny, the Romans derived the custom of wearing rings from the Greeks, but Livy ascribes its introduction to the Sabines, and Florus to the Etruscans. At first all rings were of iron, and such continued to be worn by many noble families as a distinguishing mark after gold rings had come into common use. For a long time not even the Roman senators wore rings of gold, but they were given to ambassadors at the public expense as a part of their official dress, to be used only on ceremonial occasions. Afterward the privilege was extended to senators, to chief magistrates, and to those of the equestrian order, who were said to enjoy the *jus annuli aurei* or *jus annulorum*. After the battle of Cannæ Hannibal sent to Carthage three *modii* of gold rings which had been stripped from the fingers of the slain Roman knights. Under the empire the right of granting the *annulus aureus* was assumed by the emperors, and even magistrates and governors of provinces conferred the privilege of wearing it upon inferior officers and those whom they desired to honor. In the reign of Tiberius many protected themselves from the consequences of the infraction of certain laws on the plea that they wore the gold ring, in consequence of which an ordinance was passed directing that it should be worn only by freemen whose fathers and paternal grandfathers had possessed a property of 400,000 sesterces. Aurelian gave the right to all the soldiers of the empire, and under Justinian every citizen was entitled to it. With the increase of luxury the

Romans, like the Egyptians and Greeks, covered their fingers with rings, wearing one on each joint, not excepting even the thumb. According to Martial, Charinus wore 60 rings, or six on each finger. Fops had rings to suit the seasons, light ones for summer and heavier ones for winter. The Romans introduced from Egypt the custom of engraving animals on their signets; afterward the portraits of heroes and of princes took their place; and later, indelicate symbols were frequently displayed. Rings were often of immense value; that of the empress Faustina is said to have cost \$200,000, and that of Domitia \$300,000. Plain rings were worn originally by the Romans on either hand, but when gems were added they were worn on the left hand. The Jews wore the signet ring always on the right hand, on the middle or the little finger; but with the Egyptians the fourth finger of the left hand was the ring finger.—The early Christians adopted the use of rings. At first they wore simple circles of ivory, bronze, iron, or some other cheap material, and great numbers of these have been found in the Roman cemeteries; but soon this custom degenerated into such an abuse that the fathers of the church, particularly Tertullian, Cyprian, and Jerome, were obliged to inveigh with severity against the prodigality of rings of gold and precious stones. Many of the Christians adorned their rings with symbols connected with their faith,



FIG. 1.



FIG. 2.

such as the cross, the monogram of Christ (fig. 1), the fish (ΙΧΘΥΣ; see Cross), the dove, anchor, ship (fig. 2), palm branch, &c.; some with the portrait and name of Christ, or the images of the apostles or saints; and others with simple religious phrases, among the most common of which was VIVAS IN DEO or

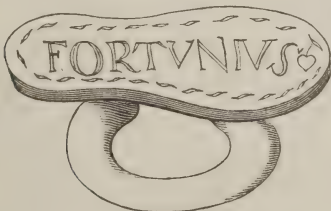


FIG. 3.

SPES IN DEO. Rings to be used as seal rings alone were fitted with a plate of metal, which usually bore the owner's name together with some sacred symbol. This often took the

form of the bottom of a sandal or of the human foot (fig. 3), an outgrowth probably of the ancient tradition which made this image the symbol of possession.

Among the rings found in the catacombs are some with a key, and some with both a key and a seal (fig. 4), the latter for both locking and sealing a casket. A ring was worn by the early Christian bishops, and the custom still prevails in the Roman church. At the consecration of a bishop, this ring, called the episcopal or pastoral ring, is blessed and put upon the fourth finger of

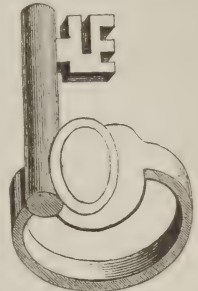


FIG. 4.

his right hand, as a sign of his alliance with the church. Pope Gregory IV., who was elected in 827, in his work *De Cultu Pontificum*, says the ring is not put on the left hand, because it would seem to give credence to the pagan notion that a vein ran directly from the fourth finger of the left hand to the heart; but on the more worthy right hand, which gives the holy benedictions. The episcopal ring is always of gold set with an unengraved precious stone, usually an amethyst, but sometimes a sapphire, ruby, emerald, or crystal. In 1875, in the course of excavations in the chapter house of Durham cathedral, England, sapphire rings were found in the coffins of the bishops Ralph Flambard, who occupied the see from 1099 to 1128, Geoffrey Rufus, who died in 1140, and William de Sancta Barbara, who died in 1152. The ring of a cardinal is set with a sapphire. The seal ring of the pope is of steel, and is in the keeping of the cardinal chamberlain or chancellor; since the 15th century it has been used for sealing the apostolic briefs. On the death of a pope his ring is broken, and a new one is made for his successor. In England it is customary for sergeants at law on being sworn in to present gold rings to the law officers, certain other officials, and those who come to the inauguration feast. In 1737 1,409 rings, of the value of £773, were given away on the occasion of the admission of 14 sergeants. Rings were also formerly given away at weddings. Edward Kelly, the famous alchemist of Queen Elizabeth's days, is said to have given away at the marriage of one of his maid servants gold wire rings to the value of £4,000. It was with a golden ring that the doge of Venice wedded the Adriatic on Ascension day, casting it into the waters with these words: "We espouse thee, O sea, as a token of our perpetual dominion over thee."—The wedding ring is supposed to be of Roman origin, and to have sprung from the ancient custom of using rings in making agreements, grants, &c. It was usually given at the betrothal as a pledge of the engagement, and its primitive form was

probably that of a seal or signet ring. In Germany it has been common for the wife to wear the betrothal ring after marriage, and the husband the wedding ring. Widows formerly wore the wedding ring on the thumb, as an emblem of widowhood. Betrothal rings were frequently exchanged in ancient times by lovers. Gimmel, jimmel, gimbal, or gimmon rings are twin (*gemelli*) or double rings, made of gold wire twined together; but sometimes three and four rings were thus joined. It is also believed that the Romans originated the custom of giving rings with mottoes or posies engraved on them to their lady loves. In the 14th and 15th centuries the posy was usually inscribed on the outside of the ring, but afterward on the inside. Among the most common posies on old rings are the following: "Let lyking laste;" "Let us share in joy and care;" "I like my choice;" "A faithful wife preserveth life;" "Love and live happy;" "United hearts death only parts;" "I'll win and wear you;" "In Christ and thee my comfort be;" "This and the giver are thine for ever;" "Knit in one by Christ alone;" "As God decreed, so we agreed." Sometimes stones are so arranged as to form a posy, the first letter of each being read like an acrostic, thus: L apis lazuli, O pal, V erde antique, E merald.—Many superstitions have been connected with wedding rings. The once prevalent notion that an artery or nerve extended from the ring finger to the heart is of very ancient origin, and is probably due to the Egyptians. It has been thought too that the wedding ring is possessed of curative powers, and some persons still believe that a sty on the eyelid will disappear after being rubbed with a gold ring. Other rings than wedding rings were also used to cure diseases; a gold ring was supposed to be efficacious against St. Anthony's fire, and one made of silver collected at the communion was good against convulsions and fits. They sometimes owed their virtue to the stones with which they were set: thus diamond was believed to be an antidote against all poisons; ruby changed its color if any evil was about to befall the wearer of it; sapphire and the bloodstone checked bleeding at the nose; amethyst was an antidote against drunkenness; coral hindered the delusions of the devil; topaz cured and prevented lunacy; and the toadstone was considered a sovereign remedy against many disorders. Rings were also believed to possess magical virtues and to be full of occult significance. Plato records that Gyges, king of Lydia, possessed a ring which rendered him invisible when the stone was turned inward. The same story is told of Midas, the mythical king of Phrygia. The Arabians have a book called *Salcuthat*, which treats of magic rings. Among them is mentioned Solomon's ring with which he sealed up refractory jinn in jars before they were cast into the sea. Magic rings were manufactured in great numbers in Athens, and

endowed with whatever charm the purchaser required. The Gnostics engraved ring gems with mystic symbols, names, monograms, and legends, which were supposed to have peculiar values; and in the early ages the names of Jesus, Mary, and Joseph on rings were deemed to be preservatives against the plague. Rings were sometimes made hollow to contain poison. Hannibal died of poison which he carried in his ring. The ring of Cæsar Borgia had a slide within which he is said to have carried the poison that he sometimes dropped into the wine of his guests; and it is said that his father Alexander VI. possessed a key ring which had a concealed poisoned needle within it, and which, when he desired to rid himself of a person, he gave him to unlock a casket.

RINGGOLD, a S. county of Iowa, bordering on Missouri, and intersected by Platte river and by the E. and W. forks of Grand river; area, 576 sq. m.; pop. in 1870, 5,691. The surface is undulating and the soil fertile. The chief productions in 1870 were 40,381 bushels of wheat, 340,735 of Indian corn, 79,159 of oats, 27,894 of potatoes, 52,856 lbs. of wool, 163,485 of butter, and 14,325 tons of hay. There were 2,612 horses, 2,306 milch cows, 4,112 other cattle, 14,219 sheep, and 8,764 swine. Capital, Mount Ayr.

RINGWORM. See EPIPHYTES, vol. vi., p. 689.

RIO ARRIBA, a N. W. county of New Mexico, bordering on Arizona, and intersected in the southeast by the Rio Grande; area, about 5,500 sq. m.; pop. in 1870, 9,294. The E. part is watered by tributaries of the Rio Grande, the W. part by affluents of the San Juan, and it is crossed by several mountain chains. The chief productions in 1870 were 5,249 bushels of wheat, 10,351 of Indian corn, and 19,663 lbs. of wool. There were 399 horses, 749 mules and asses, 547 milch cows, 1,532 working oxen, 1,573 other cattle, 40,772 sheep, and 256 swine. Capital, Los Luceros.

RIO BRAVO DEL NORTE. See RIO GRANDE DEL NORTE.

RIO DE JANEIRO. I. A province of Brazil, lying between lat. 20° 50' and 23° 25' S., and lon. 40° 50' and 44° 40' W., bounded N. by Espírito Santo, N. W. by Minas Geraes, S. W. by São Paulo, and E. and S. by the Atlantic; area, about 18,000 sq. m.; pop. in 1871, 1,050,000, of whom 306,000 were slaves. (These numbers, and some others, are according to the *Almanach de Gotha* for 1875 and other recent authorities, those in the article BRAZIL having been derived from earlier sources.) The surface of the province is mountainous, being traversed by the Serra dos Orgãos (the local name of the Serra do Mar), and bounded W. by the Serra Mantiquiera. In the latter chain, about 5 m. from the N. W. corner of the province, is Itatiaiossú, the highest peak in Brazil (10,300 ft.) Many isolated hills rise from the plains, which are low and marshy. The only important river, the Parahyba do Sul, rises near Paraty, and, after a circuitous and

precipitous course of 400 m. between the two mountain chains (partly through the province of São Paulo), empties near the N. limit of Rio de Janeiro; it is navigable for only 50 m. from its mouth. Numerous salt lakes border the coast, and in the interior are extensive sheets of fresh water. There are many islands on the coast, the largest of which are Ilha Grande and Marambaya. The principal ports are Angra dos Reis, São João, Mangaratiba, Frio, Macahé, and Rio de Janeiro. The last, the only one of importance, is in the bay of the same name, and is one of the best in the world. It is an irregular basin penetrating inland 15 m., with a breadth varying from 2 to 9 m. The entrance, only 1,700 yards in width, is between steep hills, the eastern about 1,000 ft., the western 1,270 ft. in height. The latter is a conical isolated mass of gneiss, called Pão de Assucar. At its base is a fort, and on its opposite side another, forming the salient points of a system of fortifications designed to be impregnable. Just within and nearly midway of the entrance is an isolated rock, also fortified. The basin soon widens, and the shores trending in deep curves form beautiful bays and coves. Many islands and islets are scattered over its surface, the largest of which are cultivated and many of them fortified. Numerous streams empty into the basin, freshening its waters and forming banks on which grow large oysters. The greatest depth of water is 150 ft., just within the entrance; thence northward it shoals gradually, and in the head of the basin there is only 6 or 8 ft. The tides, owing to local causes, are irregular. The climate of the province is agreeable and salubrious on the high lands, but warm and unhealthy on the low lands and near the sea. Vegetation is luxuriant, and crops are abundant. The forests contain varied and excellent timber, and almost all kinds of tropical and temperate plants are found. Coffee, sugar cane, cotton, mandioca, and tobacco are extensively cultivated; tea, rice, cacao, and potatoes moderately. Coffee is the great staple, and its cultivation is steadily increasing. Nearly all the vegetables of temperate climes may be raised. Every variety of tropical fruit abounds, and flowers of rare beauty and fragrance adorn the gardens and forests. Among the native animals are the ounce, tapir, wild hog, and monkey. There are immense herds of cattle. The forests swarm with birds of brilliant plumage, and there is a large variety of beetles, butterflies, and other insects, many of them of great beauty. Fish of many varieties are found in all the waters. There is gold in the Cantagallo region near Minas Geraes, and garnets and amethysts are found. Iron is abundant, but no mines are worked; and granite, a great variety of marble, and several kinds of clay suitable for earthenware and porcelain abound. The province is divided into 17 districts, which are subdivided into municipalities, and these into parishes. Primary education is obliga-

tory. The state provides 164 primary and 4 advanced schools, and there are about 200 private schools in the province. The largest city, Campos, on the right bank of the Parahyba, about 35 m. from the sea, is said to contain 40,000 inhabitants. Niteroy or Niteroy, the capital, contains 25,000 inhabitants, but owing to its situation near Rio de Janeiro it is practically a suburban town. Petropolis, in a valley of the Orgãos, contains the summer palace of the emperor and many villas. Railways are constructing throughout the province, but the "Dom Pedro II." is the only completed road of importance. The chief cities are connected by telegraph. The commerce of the province is absorbed by the city of Rio de Janeiro. **II.** A municipality (Município Neutro) enclosed by the province of the same name, bounded N. by the rivers Guandú-Minin and Mirity, W. by the Guandú, S. by the Atlantic, and E. by the bay of Rio de Janeiro, the islands therein forming a part; extreme length from E. to W. 36 m., extreme breadth 24 m.; area, about 540 sq. m.; pop. in 1872, 274,972, of whom 48,939 were slaves. There are several groups of mountains within its limits, among the highest peaks of which are Tijuca, 3,447 ft., Gavia, 2,575 ft., and Corcovado, 2,272 ft. These, viewed from the sea, present a remarkable outline known as the "sleeping giant." Large boulders are scattered everywhere. In the plains and valleys are lakes of considerable size, only a few feet above the sea level, and there are numerous small streams and torrents, and many mineral springs. The coast is bordered with islands. Agricultural industry is devoted chiefly to the cultivation of fruit, vegetables, cereals, and grass to supply the markets of Rio de Janeiro; but there are several extensive coffee and sugar plantations, and large fields of mandioca. The municipality, which embraces the capital of the empire with a number of small communes, is governed directly by the executive and legislative authorities of the empire; it is divided into 19 parishes, and sends three deputies to the national assembly. There are 185 public and private schools for primary education, with an average daily attendance of nearly 15,000. **III.** The capital of Brazil, and the largest city of South America, situated in the Município Neutro, on the W. shore of the bay of Rio de Janeiro, in lat. 22° 54' S., lon. 43° 10' W.; pop. about 260,000. It is of irregular shape, being built chiefly on a narrow undulating plain extending for 6 m. along the bay. Several rocky hummocks, which rise from the low ground, give the city a picturesque appearance. The older streets are very narrow, and the older houses, generally of two stories and without architectural beauty, are badly arranged and poorly ventilated. The newer streets are wider, and the houses are of improved design, but wanting in modern conveniences. Many are painted in gaudy colors, some are ornamented with varie-

gated tiles, and others are covered with stucco; only a few are of granite or brick. The suburban dwellings are usually surrounded with gardens. The business streets are paved with cobblestones, and the others macadamized. Extensive sewers, of the aggregate length of 75 m., have recently been constructed throughout the city. At their three outlets attempts are made to disinfect and filter the sewage before it passes into the bay. Water is brought from Mt. Corcovado by means of an aqueduct which is more than 100 years old. It is 12 m. long, and crosses a valley 90 ft. deep and 740 ft. wide, upon two tiers of arches, one above the other. The water is distributed throughout the city to fountains, from which it is drawn for use. The supply is insufficient for the increasing demand. The streets, especially those of the suburbs, are lighted better than those of any other city in the world. The principal public edifices are the chamber of deputies and city palace of the emperor, in one spacious unattractive building fronting Palace square; the imperial chapel, of no architectural merit and unadorned, on the same square; the exchange, a low building divided into stalls which are rented to brokers, and containing a good reading room; the post office, unworthy of the business transacted through it; the custom house, perhaps the finest structure in the city; and the marine arsenal, also a fine building, at the end of the rua Direita, in which are all the preceding. The rua Ouvidor, leading out of this, is the principal street of Rio de Janeiro; from it leads the largo do São Francisco, on one side of which is the church of the same name and on the other the military academy. A narrow street leads thence into the largo do Rocio, in which is the theatre of São Pedro d'Alcantara. In the middle of this square is an equestrian statue of Dom Pedro I., the pedestal of which is ornamented with Indian figures emblematic of the great rivers of Brazil. The Campo Santa Anna, the largest square of the city, is unadorned and filthy; on one side of it is the senate, on another are military barracks and the offices of the minister of war, on a third those of the minister of commerce, and on the fourth the Italian opera house and a museum. Among the remaining public buildings are the hospital of Misericórdia, the mint, the academy of fine arts, the observatory, and the palace of São Christovão. Among the charitable institutions are several hospitals for natives, one for Portuguese, one for English, and others for French and Spaniards. The educational institutions are a national college, a military and engineering school, a naval academy, a commercial school, a school of medicine and surgery, a geographical and historical institute, a polytechnic and an agricultural school, several night schools for adults, and many other schools. The city contains 30 churches and chapels, and six convents and monasteries. Besides an Anglican chapel there are several

congregations of other Protestant denominations, composed chiefly of foreigners, the natives being nearly all Roman Catholics. The hotels, with one exception, furnish wretched accommodations. There are several libraries, only one of which, the imperial, contains books in different languages, the others being small and purely local. The imperial library, formerly the royal library of Portugal, brought from Lisbon by the emigrating royal family, has now upward of 100,000 volumes. Among other treasures it possesses the only complete series of Dürer's woodcuts of the "Passion of Christ." There are a government printing establishment and about 50 private publishing and printing houses; 70 native periodicals of little merit, a well conducted English daily newspaper, and a French and a German daily. There is one large market, plentifully supplied with great varieties of fish, poultry, fruit, and vegetables, but deficient in good meat and game. Of the two public gardens, the Passeio Publico is within the city, and the botanical just beyond its limits. Several lines of street railway traverse the city and its suburbs; omnibuses run to all the neighboring villages; two lines of steam ferry boats cross the bay; the Dom Pedro railway connects with the Parahyba river; and a steamer runs to the terminus of the Petropolis railway at the head of the bay. Steam communication with the seaports of the empire is frequent, European steamships arrive and depart almost daily, and there is telegraphic connection with Europe. A sea wall is now (1875) under construction along the water front of the city, beside which the largest vessels may lie. On the N. side of the Ilha das Cobras, off the N. E. extremity of the city, is a dry dock excavated from the solid rock, capable of admitting a vessel 280 ft. long and of 28 ft. draught; and a much larger one is in course of construction near it. There are numerous ship yards, and factories for the manufacture of cotton, tobacco, paper, soap, glass, and carriages, but none of the factories are very extensive. The climate is damp and unhealthy, and the city is seldom free from yellow fever, but this rarely assumes a malignant form. Diseases of the respiratory organs are very common. The mean annual temperature is 82° F.; the mean annual rainfall, 42.5 in. —The trade of Rio de Janeiro is hampered by the national export tax, which averages 13 per cent. on all articles of home production. The exports for the fiscal year 1872-'3 were valued at \$52,643,275, as follows: coffee, \$48,048,725; gold in bars and dust, \$2,108,462; diamonds, \$587,424; tobacco, \$521,990; hides, \$484,080; cotton, \$408,480; timber, \$275,165; sugar, \$133,559; rum, \$68,784; horse hair, India rubber, and wool, \$6,606. The United States takes about 58 per cent. of the coffee and half of the timber (fancy woods); Great Britain takes about half of the remaining exports; the residue is chiefly sent to France and Germany. The imports are very varied;

the value for the fiscal year 1872-'73 was \$36,511,450; more than one half are from Great Britain, about one fourth from France, the remainder chiefly from the Plata, Germany, and Portugal. Flour, kerosene oil, lumber, lard, rosin, and turpentine are almost the only articles received from the United States, the value of which in 1873 was \$2,415,000. The customs receipts of the port for the two financial years 1870-'72 were \$27,648,429. The import tax ranges from 40 to 50 per cent. The arrivals from foreign ports during the year 1873 were 4,431 vessels, of 2,639,362 tons; the departures 3,358, of 2,807,299 tons. The arrivals from Brazilian ports were 6,421 vessels, of 1,051,928 tons; departures, 7,203, of 1,345,648 tons. The total movement of shipping for 1873 was 7,844,237 tons. The trade of the port increases slowly, owing to exorbitant charges and unnecessary delay, which greatly diminish legitimate profits.—Although the bay of Rio de Janeiro was undoubtedly visited soon after the discovery of Brazil, and as early as 1502, it remained without name until Juan Diaz de Solis entered it on Jan. 1, 1516; thinking it the entrance to a river, he named it Rio de Janeiro (river of January). The first settlement was in 1531, but it was abandoned at the end of four months. The province having been conferred by John III. of Portugal as a gift on Martim Affonso de Souza, a small fort was built and a settlement formed near the entrance by him in 1552. This was neglected and appears to have been abandoned, for some French Huguenots under the command of Admiral Villegagnon formed the first permanent settlement in 1555, and erected a fort on the islet which now bears the name of their leader. The French were well received by the Indians, the Tamoyes, who were at enmity with the Portuguese; they carried on a lucrative trade with them, and named the colony Henriville, and the adjacent country Antarctic France. John III. ordered their expulsion, which was accomplished in 1565 by the governor of Bahia, who in 1567 founded another Portuguese colony near the present site of the Misericordia hospital, naming it São Sebastião. The history of the first century of the colony is replete with wars of extermination against the Indians, civil dissension among the colonists, and cruelty, oppression, and assassination. In 1710 the French made an unsuccessful attempt to take possession of the bay; their commander was taken prisoner and assassinated. The attempt was renewed in 1711 with success, but the commander, Duguay-Trouin, accepted a ransom and abandoned the bay. In spite of mismanagement and difficulty, the colony as well as the whole province prospered; and in 1763 Rio de Janeiro was made the capital of the viceroyalty. In the beginning of 1808 the royal family of Portugal came to Brazil on account of the occupation of the mother country by the French; their presence gave an impetus to the growth

of the city, which has ever since remained the first in commercial importance in Brazil. After the return of King John VI. to Portugal (1821) the Brazilians declared their independence and established an empire, with Dom Pedro I., the son of the king of Portugal, as emperor (1822). Thenceforward the history of the city is that of the empire. The capital of the province was transferred to Nictheroy and the municipality of Rio de Janeiro created in 1834.

RIO DE LA PLATA. See PLATA, RIO DE LA.

RIO GRANDE, a S. W. county of Colorado, formed since the census of 1870, intersected by the Rio Grande; area, 1,200 sq. m. The surface is mountainous, the San Juan being the principal range. There are valuable gold mines. Capital, Del Norte.

RIO GRANDE, or **Guahey,** a river of Bolivia, which rises in the S. declivity of the mountains near Cochabamba, and flows in a S. E. direction through the plains of the province to lon. 62° W. Here it bends abruptly N., and after a semicircular sweep round the eastern base of the Sucre mountain chain, holds a N. W. course to its junction with the Mamoré, S. of Trinidad, about lat. 15° S. Exclusive of its numerous sinuosities, it has a total length of about 700 m., the lower half being easily navigable by small steamers. Almost its entire course is through a densely wooded country. Among its affluents, most of which are from the west, is the Flores, a stream of considerable magnitude.

RIO GRANDE DEL NORTE, or **Rio Bravo del Norte,** commonly called simply the Rio Grande, a river of North America, rising in the S. W. part of Colorado, between the La Plata and San Juan mountain ranges. It flows E. for about 150 m., then bends abruptly S., entering New Mexico between the Sierra Madre and the main chain of the Rocky mountains, and flows through that territory to the Mexican border; thence it pursues a general S. E. course, separating Texas from Mexico, to the gulf of Mexico. Its entire length is estimated at 1,800 m. The upper part of its course is obstructed by rocky ledges and cataracts, and the lower part by sand banks and numerous wooded islands; but small steamers have ascended to Kingsbury's rapids, about 450 m. from the sea. The Rio Grande is subject to periodical floods, which commence in April, are at their greatest height in the beginning of May, and fall toward the end of June. For the greater part of the year it is fordable almost everywhere above the influence of the tide. The only important tributary is the Rio Pecos, which rises on the E. slope of the Rocky mountains, in N. E. New Mexico, flows S. through the E. part of the territory to the Texas border, and thence S. E. to the Rio Grande, which it enters about 500 m. above the gulf. Its entire length is estimated at 700 m. At certain seasons its bed becomes dry. Both the Rio Grande and the Pecos flow for the most part through an arid

region; but their valleys, which are generally from 1 to 4 m. wide, that of the Rio Grande expanding in places to 10 or 15 m., are productive when irrigated. The principal towns on the Rio Grande are Brownsville, Texas, about 35 m. from its mouth, and Matamoros, Mexico, opposite Brownsville.

RIO GRANDE DO NORTE, a maritime province of Brazil, bounded N. and E. by the Atlantic, S. by Parahyba, and W. by Ceará; area about 18,000 sq. m.; pop. in 1871, about 230,000, of whom about 13,500 were slaves. The coast is bordered by a chain of dangerous reefs and shoals, and the only good port is that of Natal, an irregular bay commonly called Rio Grande. Two watersheds running N. and S. divide the province into three almost equal parts, and give rise to many streams. The only important river is the Piranhas, which rises in Parahyba, passes through the middle of the province, and empties through five mouths, forming a large delta. It is navigable for 25 m., as far as the town of Assú, on the left bank. The Apody, passing through the western part, is navigable by canoes. Branches of the Borborema mountains extend into the province. The surface is sandy near the sea, and arid in the interior, except on the high lands and bordering the rivers, where there are extensive pastures and some forests. Gold, silver, and iron are found in small quantities, amianthus, limestone, crystals, and salt exist, and sulphur is met with. Good timber is abundant; gums, resins, balsams, Brazil wood, medicinal roots, wild honey, cochineal, and wax are among the natural productions. The carnahuba palm is extensively cultivated for a great variety of uses. Many tropical fruits abound; sugar, cotton, mandiocca, rice, beans, and tobacco are cultivated. The native animals are few, the reptiles numerous, many of them venomous. Large herds of cattle are raised. Sea salt is extensively extracted along the N. coast. The climate is very warm, dry, and unhealthy, severe droughts being frequent in the interior. The province is divided into eight districts. There are 62 public primary schools (41 for boys, 21 for girls), with an average daily attendance of 2,622, five secondary schools, and three private schools. The foreign exports of the province in 1873 were: cotton, \$385,344; sugar, \$165,552; hides, \$13,324; timber, \$135. The chief towns are Natal, the capital, Imperatriz, Assú, and Macaú.

RIO GRANDE DO SUL. See **SÃO PEDRO DO SUL**.

RIJOA, La. I. A W. province of the Argentine Republic, bounded N. and N. E. by Catamarca, E. by Cordova, S. by San Luis, S. W. by San Juan, and W. by Chili, from which it is separated by the Andes; area, 35,000 sq. m.; pop. in 1869, 48,493. Besides the Andes, the province is traversed in a generally N. and S. direction by the Jagüé, Famatina, and Velasco or Rioja ranges, the second containing the Nevado peak, 17,050 ft. above the sea. Be-

tween these chains are vast plateaus and valleys. The only important river is the Bermejo, descending from the Andes in the northwest, and draining the valley of Jagüé. Gold, silver, copper, iron, tin, and quartz occur extensively in the Famatina chain, precious stones in that of Velasco, and nickel, lead, antimony, carbonate of soda, salt, nitrate of potash, and nitrate of soda elsewhere. There are now (1875) in operation two gold, seven silver, and two copper mines. Maize, wheat, cotton, olives, grapes, and various other fruits are extensively cultivated; and timber, gums, honey, wax, and cochineal and other dyes are very abundant. Cattle rearing is one of the chief occupations. The manufactures comprise leather, cotton and woollen fabrics, laces, rum, cordials, and preserved fruits, all of which, with vicuña, guanaco, and puma skins, are largely exported. In 1869 there were 3,000 children attending school. The province is divided into the departments of La Rioja, Arauco, Famatina, Vinchina, Guandacol, Independencia, Costa Alta, San Martin, and Belgrano. **II.** A city, capital of the province, near the E. base of the Rioja mountains, 650 m. N. W. of Buenos Ayres; pop. in 1869, 4,489. It is situated in a vast plain, and has good streets and houses, with a parish church and three churches attached to convents. The surrounding country is remarkably fertile, and wheat and the vine are extensively cultivated. La Rioja was founded in 1591.

RIOM, a city of Auvergne, France, in the department of Puy-de-Dôme, near the left bank of the Ambère, 8 m. N. of Clermont-Ferrand; pop. in 1872, 10,770. It contains several handsome public edifices and the ruins of the ancient ducal palace. It has a college, an insane asylum, and a monument to Desaix, who was born near this town. The chief manufactures are linen, distilled spirits, and articles of wax. There is trade in grain, wine, hemp, leather, preserved fruits, and oil. In the 14th century Riom was the capital of the duchy of Auvergne.

RION. See **PHASIS**.

RIO NEGRO. I. A river of South America, an affluent of the Amazon, which rises in the state of Cundinamarca, United States of Colombia. Above the Cassiquiare it is called the Guainia, and a portion of its lower part is known as the Paraná Pishuna. After flowing E. about 200 m. from its source, it turns S. to lat. 2° N., where it is joined by the Cassiquiare, whose mouth is 600 yards wide, and which connects it with Orinoco. (See **CASSIQUIARE**.) About 50 m. below this it enters Brazil, and at the equator is joined by the Uaupes or Ucayari, which rises in the same hills as the Negro, but pursues a widely divergent course. After the junction the Negro descends over a series of rapids to São Gabriel, about 600 m. from its mouth at Manaos, and then becomes navigable, with a current of 3 or 4 m. an hour, flowing E. about 250 m. and receiving many

tributaries. About lon. 63° W. it receives the Rio Branco, after which it turns S. E., widens in some parts to 12 or 15 m., and becomes deep and sluggish, its waters sometimes flowing backward during the annual rise of the Amazon. Its extreme length is about 1,200 m. Steamers ascend to São Gabriel. The Negro was discovered by Favella in 1637, and soon after the Portuguese founded a settlement near the present site of Manaos. II. A river of South America, forming the boundary between the Argentine Republic and Patagonia. It rises between lat. 38° and 39° S., on the E. slope of the Chilian Andes, descending in four streams which unite and flow southward to lat. 40° 30', where it turns N. E. and flows over a series of rapids to about lon. 69° W. Here it receives the Neuquen from the north, after which it flows E. to lon. 66°, where it forms two islands, Rosas and Cholechel, the latter, which is 210 m. from the sea, being 27 m. long by 3 m. broad. It then pursues a general S. E. course to its mouth in lat. 41° 2' S., lon. 62° 45' W. Navigation to Cholechel island is always unimpeded. The lands along the river are well adapted to grazing and agriculture, and many kinds of valuable timber abound. Carmen de Patagones, a flourishing town of 6,000 inhabitants, is situated on both banks about 20 m. from the sea. The river banks near this place are thickly settled by Scotch and English farmers; the most distant settlement is about 100 m. from the sea. The value of the exports in 1873 was \$430,000. The Negro was first explored by Villarmo, who after encountering great difficulties reached the base of the Andes. In 1873 the Argentine government sent up an exploring party in a steamer, but after many mishaps the expedition was abandoned.

RIOT (Norman law Lat. *riota*, *riotum*; Fr. *riotte*, a brawl), in law, a tumultuous disturbance of the peace by three persons or more, who have assembled together of their own authority, for the purpose of assisting one another in the execution of some private enterprise, and in resisting any one who shall interfere with or oppose their proceedings, and afterward actually carrying out that purpose in a violent and turbulent manner to the terror of the people. It is wholly immaterial whether the act intended is lawful or unlawful; for it is not the act itself, but the manner in which it is done, which creates this particular offence. Two persons alone may be guilty of a conspiracy, but it requires three to make a riot; and where three persons were indicted for a riot, and the jury found only one of them guilty, it was held that this verdict was void because one alone could not make a riot. Women may be punished as rioters, but infants under 14 years of age cannot. The object of assembling is commonly a private quarrel or wrong; for the proceedings of a riotous assembly to redress public grievances or resist the officers of the king or state may amount to overt acts of

high treason, by levying war against the sovereign. In the latter case, the indictment generally charges that the defendants were armed and arrayed in a warlike manner, and, where the case admits it, with swords, drums, colors, and the like. But the question of riot or treason does not turn singly on any of these circumstances; the true criterion is: With what intent did the parties assemble—whether for a private and particular, or a public and general purpose? Numbers may supply the want of military arms and discipline, as experience has often shown, and such was the opinion of five of the judges in the weavers' case in 1675. In this case the weavers in and about London riotously assembled to destroy certain looms and machinery which had enabled those of their trade who used them to undersell the rest; and the defendants were indicted for treason, but were finally only proceeded against for a riot; the remainder of the court holding that their proceedings did not amount to a levying of war, as the motive was a mere private quarrel between different parties of the same trade, and related to no public or general object. On the trial of Lord George Gordon, the leader and instigator of the celebrated "no popery riots" in London in 1781, it was the unanimous opinion of the king's bench that an attempt by intimidation and violence to force the repeal of a law was a levying of war against the king. So, too, in the case of Demaree and Purchase, indicted severally in 1719, "for that they with a great multitude of people, to the number of 500, armed and arrayed in warlike manner, &c., did traitorously levy war, &c.," it appeared that the rabble, with cries of "Down with the Presbyterians," "Down with the meeting houses," &c., undertook by force and violence to carry their threats into execution, and actually did destroy a great deal of property, and resisted the officers sent to disperse them; and the judges agreed that this was a declaration against the "act of toleration," and an attempt to render it ineffectual by numbers and open force, and amounted to high treason. In every riot there must be such circumstances of actual force and violence, or an apparent tendency thereto, as will naturally strike terror into the people; though it is not necessary that actual force or violence should have been committed. The violence and tumult must also be premeditated; for if they arise accidentally from some cause not likely to produce them, it is but an affray. Thus, if several are assembled together for a lawful purpose and a quarrel happens among themselves, it is not a riot, but only a sudden affray, and none in the assembly are guilty but those who actually participate. But even though the persons assemble in the first instance for a lawful purpose and with peaceable intent, yet they may afterward be guilty of a riot. For instance, if a dispute arise among them, and they form themselves into parties or factions, with promises of mutual assistance, and then make an

affray, it is a riot; for the fact of forming such factions or parties and then acting with a definite and unlawful intention is constructive evidence of premeditation. If three or more persons, lawfully assembled, quarrel among themselves, and the party falls upon one or more of their own number, this is a simple affray; but if they attack a stranger, the very moment the quarrel begins it becomes an unlawful assemblage, and it is a riot in all those who join the affray, but only in them. So a person seeing a riot and joining therein becomes a rioter himself, though he did not go there premeditating the act, and is liable as a principal with the rest. The inciting persons to assemble in a riotous manner is also indictable. The law will not allow individuals to seek redress for private grievances by disturbing the public peace, though in some cases the justice of the quarrel in which they are engaged may be a great mitigation of the offence. —By the common law, riots were punished by fine and imprisonment, and if enormous by the pillory. But these penalties being found insufficient, statutory provisions were early made for their suppression. The first English statute enacted for this purpose was 34 Edward III., c. 1, E. II., which gave justices of the peace very extensive authority in such cases, and visited the offence with severe punishment. The statute 1 George I., commonly called the "riot act," made it a capital felony for persons riotously assembled to the number of 12 or more to continue so assembled for one hour after proclamation by a justice of the peace requiring them to disperse; thus leaving the offence, if committed by more than 3 and fewer than 12 persons, punishable by fine and imprisonment only, but if by 12 or more by death. Subsequent statutes made other specific offences felonious, such as riotously demolishing any church or chapel, or any house or other building, or any machinery or manufactory, or forcibly obstructing the export of corn from any part of the kingdom. Principals in the second degree and accessories before the fact were also punishable as felons. In the United States the statutory provisions respecting riots follow in a great measure those of England, but are milder in their punishments and more qualified in their application.

RIPARIAN (Lat. *ripa*, the bank of a river), in law, a term relating to the rights and privileges of persons who own lands lying upon or bounded by streams or rivers. At the common law all bays and arms of the sea, and all rivers wherein the tide ebbed and flowed, were considered navigable, or public highways; and all rivers, irrespective of size, where the tide did not ebb and flow, were unnavigable. The owner of land lying upon an unnavigable stream (in the common law sense) owns the bed of such stream to its centre, or thread; and the grant of a piece of land bounded by a river will carry the exclusive right and title of the grantee to the middle of the river, unless

the grant certainly expresses the intention of the grantor to convey only to the bank or margin. If a person owns the land lying on both sides of the river, he also owns the whole river as far as his land extends along it; and the owner in fee of land lying under an unnavigable river, whether he owns the whole bed or only to the centre on one side, may sell and convey such land separate from the upland to which it is attached. Where a river is actually navigable for boats and rafts, the public have an easement in the water for this purpose, and are entitled to a right of passage up and down, which the riparian proprietors cannot interfere with or prevent; and all obstructions or impediments to the free use of the river in this manner are public nuisances, which the public may lawfully abate. The owners hold the land under the water subject to the public right of passage over it. The proprietors of adjoining banks are entitled to use the water of the river, and the land under it, as regards the public, in any manner or for any purpose whatever, not inconsistent with this easement; and neither the state nor any private individual has a right to alter the course or character of the stream, or to render it by any means less useful to the owner of the soil. —When a piece of land in a conveyance lies upon and is bounded by a navigable pond of water, it is generally held that the grant only extends to the margin of the pond, and the grantee acquires no right to the soil beneath it. So riparian owners on technically navigable rivers, that is, on rivers in which the tide flows, are not entitled, as a matter of right, to the soil under the water in front of their uplands, because it belongs to the state. The land covered by navigable ponds and lakes also belongs to the state when these are not private property, but a grant of the bed of such a pond or lake could only be made to the owner of the adjoining shore. —If the water running between the lands of separate owners gains gradually and imperceptibly upon one side or the other, the title of each continues as before to the middle of the stream regardless of the change. But if the change takes place suddenly and visibly, the ownership remains unchanged, and the boundary line continues as previous to the alteration, at what then was the middle of the stream. If therefore the river should suddenly and entirely forsake its natural channel, and make for itself a new one in the lands of the proprietor on one side, he would thereby become the exclusive owner of the soil under the whole river so far as it was enclosed in his land. If soil be formed by alluvium or the washing up of earth out of the river, by slow and imperceptible accretion, or by the dereliction of waters which have gradually receded and left the land beneath them bare and dry, it belongs to the owner of the adjoining land. Islands formed in the same manner are subject to the same rule. If they are formed near the shore, they belong to the person who owns the land on

that side of the stream to which they are nearest; if they are formed in the middle of the stream on both sides of the dividing line or centre, they belong to the proprietors on both sides in proportion to the extent which may lie on their respective sides of the line. Lands and islands formed out of the sea, or in navigable, *i. e.*, tide rivers, belong to the sovereign or state, and not to the proprietors of the adjoining shore. By the common law the seashore, being that part between high and low water mark where the tide ebbs and flows, belonged to the sovereign or state, and was common to all the public, the possession of the adjoining proprietors extending only to high-water mark; but in this respect the common law has been changed in Massachusetts and Maine, as to owners on bays and arms of the sea, by the colony ordinance of 1641 and the usage arising therefrom, and the proprietorship goes to low-water mark, subject to the public easement, and not exceeding 100 rods below high-water mark. And now, in other states which lie on tide waters, the owner of land has some right to use it as far as low water, for the purpose of putting a wharf or similar building there.—The common law definition of a navigable river, being one where the tide ebbs and flows, has been considered and judicially adjudged to be inapplicable to the great rivers of Pennsylvania, Alabama, and other states. These rivers are declared to be navigable, and the boundaries of adjacent lands extend not to the middle of the stream, but only to low-water mark. But this question, where not particularly regulated in the several states by statute or judicial decisions, is still somewhat unsettled; and even where navigable waters are declared to be common highways, and as such for ever free to the public, it does not appear that the common law principle, that he who owns the land on both sides owns the entire river, and he who owns the land on one side only owns to the middle of the river, in both cases subject only to the easement of navigation, is thereby abolished.—While every riparian proprietor has an equal right to the free use of the water which passes his land, as it is accustomed to flow, without any diminution or alteration as to quantity or quality, he has no exclusive property in the water itself, but a simple usufruct while it passes along; and he cannot appropriate it to his exclusive use, or divert it from its natural channel, without the consent of the adjoining proprietors, who have an equal right to its use with himself. If he does divert it on his own premises, he must return it to its ordinary course when it leaves his estate. He may use it to irrigate his lands or to water his cattle, or he may use the whole force of it in any reasonable manner he chooses, so long as such use does not interfere with the rights of his neighbors. But he cannot use it to the prejudice of any adjoining proprietor, unless he has a prior right to divert it, or a right by grant or by prescription (which sup-

poses a grant) to some exclusive enjoyment of it. Whether, without such right, his use is reasonable, depends upon the circumstances of each case. The natural title which riparian owners thus have to the reasonable use of the waters may be restricted, altered, or enlarged by such grants or prescriptions; otherwise streams of running water could never be effectually applied either to agricultural or manufacturing purposes. Twenty years' exclusive occupation and use of water in any particular manner raises the presumption of a grant for that purpose from the adjoining proprietors; and owners whose land lies above or below must take the stream subject to such adverse right. But nothing short of an express grant, or the use and enjoyment of the water so diverted or obstructed, or materially changed in its course and character, for a sufficient length of time to raise the legal prescription of a grant, will justify the owner as against any other owner to whom such alterations may prove injurious.—By the common law the proprietor of land lying upon an unnavigable river possesses the exclusive right to fish therein, as far as the middle of the stream; and if he owns both sides he has exclusive right, for fishing purposes, to the whole river, as far as his land extends, subject only to the rights of the public in the same as a highway for navigation. But this right is qualified by the same general rule which regulates his other riparian rights; it must be so used as not to injure or interfere with the rights and privileges of others. Therefore he cannot erect dams, weirs, or other obstructions for the purpose of preventing the ascent or passage of fish. Such impediments were regarded by the common law as a nuisance, and in Massachusetts the party offending in this manner is subject to a penalty provided by statute. The common law right of fishing may be controlled or modified by the municipal law of the land, and in many of the states it is regulated by statute provisions. On navigable rivers and tide waters, however, the adjoining proprietors do not possess this exclusive right of fishing opposite to their own lands; it is a public and common privilege in which every one is equally entitled to share. But this public right of fishing in the water does not extend to permitting a stranger to pass over the land of another in order to reach the water. Neither are persons claiming and enjoying this common right entitled to draw the seine, or to fish, or build fishing huts, or dry their nets, upon the land of the adjoining owner, or upon islands which are private property; this privilege belongs exclusively to the owner of the soil. The civil law declared that the right of fishing was common in rivers, as well as in the sea, and gave the use of the adjoining banks for this purpose to the public. This principle is acknowledged where the civil law prevails, and has been adopted by some of the states in regard to their large navigable rivers, but it is unknown to the common law.—

A question which has been much discussed and variously regulated by different nations is that relating to the public right to a foot or tow path along the banks of navigable rivers, and the use of the banks for the assistance or convenience of navigation. The civil law allowed such a right, and held that all persons had the same right to bring their vessels to land and fasten ropes to the banks of the river that they had to navigate the river itself. The same doctrine is held in Louisiana, where it has been decided that, though the banks of navigable rivers are the property of those who own the adjoining lands, yet they are so far subject to the public use, that vessels may make fast to the shore and to the trees upon it, and may unload and deposit their goods there. The rule in Illinois, Tennessee, and Missouri seems to be substantially the same. In New York, Delaware, Pennsylvania, Michigan, Mississippi, Indiana, and perhaps some other states, it has been adjudged that the public have no such right as against the will of the owner. The common law, according to Bracton, was anciently the same as the civil law, but the point remained unsettled till 1789, when it was decided that there was not any right at common law for the public to tow on the banks of navigable rivers.—Another unsettled question in the United States is that respecting the right of ferriage which attaches to riparian ownership. This matter is generally regulated by statute, and the state, by virtue of the law of eminent domain, claims the right to establish ferries wherever the legislature may consider them necessary for the public accommodation, regardless of the ownership of the soil, except as giving a claim for just compensation. But the statutes usually authorize the grant of the franchise by way of preference to the owners of the land on each side of the river where the ferry is established. It has been held that the riparian owner has not, as a matter of right, the privilege of keeping a ferry, and that it can only arise from a grant, actual or implied. This was probably the rule of the common law. But, in the United States, we should say that it is the prevailing rule that the right to a ferry attaches to the riparian proprietor; that it cannot be taken from him without compensation; that he may convey the soil excepting the right of ferriage, which then becomes an incorporeal hereditament, and may be granted in the same way as a rent; and the grantee will have a right to use the adjoining soil so far as may be necessary for ferry ways, but not otherwise.

RIPLEY. I. A S. E. county of Indiana, intersected by Laughery creek; area, about 450 sq. m.; pop. in 1870, 20,977. It has a generally level surface, and the soil is fertile. It is traversed by the Ohio and Mississippi and the Indiana, Cincinnati, and Lafayette railroads. The chief productions in 1870 were 204,995 bushels of wheat, 441,645 of Indian corn, 131,771 of oats, 84,189 of potatoes, 19,504 tons of hay,

5,104 lbs. of tobacco, 48,912 of wool, 380,911 of butter, 22,511 of hops, and 46,713 gallons of sorghum molasses. There were 6,439 horses, 6,127 milch cows, 7,860 other cattle, 18,358 sheep, and 18,554 swine; 4 manufactories of brick, 16 of carriages and wagons, 8 of saddlery and harness, 8 tanneries, 10 flour mills, and 21 saw mills. Capital, Versailles. II. A S. E. county of Missouri, bordering on Arkansas, intersected by Current river, and drained by numerous creeks; area, about 600 sq. m.; pop. in 1870, 3,175, of whom 10 were colored. It has a rough and hilly surface. The chief productions in 1870 were 17,725 bushels of wheat, 142,485 of Indian corn, 14,214 of oats, 4,105 lbs. of wool, and 41,961 of butter. There were 1,068 horses, 937 milch cows, 2,357 other cattle, 2,989 sheep, and 10,470 swine. Capital, Doniphan.

RIPLEY, George. See supplement.

RIPLEY, Henry Jones, an American clergyman, born in Boston, Mass., June 28, 1798, died at Newton Centre, May 21, 1875. He graduated at Harvard college in 1816, studied theology at Andover, was ordained in Boston in 1819, and became pastor of the North Newport Baptist church, in Liberty co., Ga. In 1826 he was appointed professor of Biblical literature and pastoral duties in the Newton theological institution, Mass.; in 1833, when the duties of the professorship were divided, he became professor of Biblical literature and interpretation, and afterward of sacred rhetoric and pastoral duties. He resigned in 1860. He published "Memoir of Rev. Thomas S. Winn" (Boston, 1824); "An Examination of Prof. Stuart's Essay on the Mode of Baptism" (1833); "Notes on the Four Gospels" (2 vols., 1837-'8); "Notes on the Acts of the Apostles" (1844); "Sacred Rhetoric, or Composition and Delivery of Sermons" (1849); "Notes on the Epistle to the Romans" (1857); "Exclusiveness of the Baptists" (1857); "Church Polity" (1867); and "Notes on Hebrews" (1868).

RIPLEY, Roswell Sabine, an American soldier, born in Ohio about 1823. He graduated at the military academy at West Point in 1843, and was appointed brevet second lieutenant in the artillery. He served during the war with Mexico, and was brevetted as captain and major for gallant conduct at Cerro Gordo and Chapultepec. He subsequently served in Florida, and in 1853 resigned his commission in the army, taking up his residence at Charleston. On the breaking out of the civil war he entered the confederate service, rose to the rank of brigadier general, and was wounded at Antietam. He published a "History of the War with Mexico" (2 vols. 8vo, New York, 1849).

RIPON, George Frederick Samuel Robinson, earl de Grey and marquis of, an English statesman, born in London, Oct. 24, 1827. He was a member of parliament from 1852 to 1859, and became prominent as a liberal under the name of Viscount Goderich. On the death of his father, the first earl of Ripon, Jan. 28, 1859, he took his seat in the house of lords,

and on Nov. 14 of the same year he inherited his uncle's title of earl de Grey. He was under secretary of state for war from June, 1859, to February, 1861, and again from July, 1861, to April, 1863, and secretary thenceforward till February, 1866; and he was connected with the India board from February to July, 1861, and from February to June, 1866. At the close of 1868 he became president of the council. In 1871 he went to Washington as chairman of the high joint commission which concluded the treaty of Washington in regard to the Alabama claims, and was for his services made marquis, June 23. In 1872 he was elected for the third time grand master of the freemasons in England, which post he resigned in 1874 on joining the Roman Catholic church.

RIPPLE GRASS. See PLANTAIN.

RISTORI, Adelaide, marchioness del Grillo, an Italian actress, born at Cividale in Friuli in 1821. Her parents were comedians, and brought her up for the stage. Previous to her marriage in 1847 with the marquis Capranica del Grillo she excelled chiefly in comedy. Subsequently she became celebrated in tragedy, especially as Myrrha, Francesca da Rimini, Pia dei Tolomei, Mary Stuart, and Queen Elizabeth. She first appeared in Paris in 1855, and in 1867 and 1875 she visited the United States.

RITCHIE, a N. W. county of West Virginia, intersected by Hughes river, a branch of the Little Kanawha; area, about 450 sq. m.; pop. in 1870, 9,055, of whom 63 were colored. It has a hilly surface, covered with forests, and the soil is fertile near the streams. It is traversed by the Parkersburg division of the Baltimore and Ohio railroad. The chief productions in 1870 were 25,510 bushels of wheat, 35,635 of rye, 146,235 of Indian corn, 40,033 of oats, 4,732 tons of hay, 9,907 lbs. of tobacco, 26,828 of wool, 116,094 of butter, and 29,257 gallons of sorghum molasses. There were 1,970 horses, 5,334 cattle, 11,607 sheep, and 4,617 swine. Capital, Harrisville.

RITCHIE, Anna Cora Mowatt. See MOWATT.

RITCHIE, Thomas, an American journalist, born at Tappahannock, Va., Nov. 5, 1778, died in Richmond, July 12, 1854. After teaching four years at Fredericksburg, he removed to Richmond in 1803, and in 1804 became editor of the Richmond "Examiner," the name of which he changed to "Enquirer." He continued its editor and proprietor for 40 years, exercising an unsurpassed influence over the politics of Virginia and the Union. In 1845 he relinquished the "Enquirer" to his sons, and removed to Washington, where he edited for four years the "Union," a journal established as the organ of President Polk's administration. He subsequently returned to Richmond, and spent his latter years in retirement.

RISES, Congregation of, the name of a committee of cardinals in the Roman Catholic church, established by Sixtus V., and originally composed of six cardinals, with a number of secretaries and consultors. The number of

members depends on the will of the reigning pope. In 1875 it comprised 17 cardinals, 25 consultors, and 11 officials, including secretary, promoters of the faith, and assessors, besides the papal masters of ceremonies. The matters exclusively within its cognizance are the liturgy, the rites of the administration of the sacraments, the rubrics of the missal and breviary, the ceremonial of the church in all public functions, and the proceedings in the beatification and canonization of saints. The congregation meets once a month at the residence of the prefect, who is always the senior cardinal of the board.

RITSON, Joseph, an English antiquary, born in Stockton, Oct. 2, 1752, died Sept. 23, 1803. He was a lawyer, but devoted himself chiefly to literary pursuits. His numerous writings are marked by great accuracy, honesty, and learning, and by their abusive spirit. His harshness led to controversies, in which he seems to have been constantly engaged until his death. An "Essay upon Abstinence from Animal Food as a Moral Duty" was fiercely attacked by the "Edinburgh Review" (April, 1803), in an article written by Sydney Smith and Lord Brougham. Ritson's chief works are: "Remarks Critical and Illustrative on the Text of the last Edition of Shakspeare" (1783), an attack upon Johnson and Steevens; "A Select Collection of English Songs" (3 vols. 8vo, 1783; 2d ed., 1813); "Ancient Songs from the time of King Henry III. to the Revolution" (1790; 2d ed., 1829); "The English Anthology" (3 vols., 1793-4); "A Collection of Scottish Songs, with the Original Music" (2 vols., 1794; new ed., 18mo, 1866); "Robin Hood, a Collection of all the Ancient Poems, Songs, and Ballads now extant relating to that Outlaw" (2 vols., 1795; 3d ed., 1858); "Ancient English Metrical Romances, with Dissertation and Glossary" (3 vols., 1802); "Bibliographia Poetica," an account of English poets from the 12th to the 16th century, never completed, but forming a treasury from which many others have drawn.—See "Letters of Joseph Ritson, Esq., with a Memoir," by Sir Harris Nicolas (2 vols., 1833).

RITTENHOUSE, David, an American mathematician, born at Germantown, Pa. (near which his great-grandfather, William Rittinghuysen, a Hollander, had established about 1690 the first paper mill in America), April 8, 1732, died in Philadelphia, June 26, 1796. During his youth he came into possession of the tools and mathematical books of a deceased uncle, made clocks without any instruction, and followed the occupation of clock making. He was commissioned by the proprietary government in 1763 to determine the initial portion of the boundary line since known as Mason and Dixon's; and although his instruments were all of his own construction, the official surveyors adopted his measurements. He was subsequently employed in determining the boundaries between New York, New Jersey, and

Pennsylvania, and other states. He calculated the transits of Venus of June 3, 1769, and Dec. 8, 1874, and made a successful observation of the former in his observatory at Norriton. In 1770 he removed to Philadelphia, and in 1775 was elected to the provincial legislature. He was a member of the convention called to form a state constitution, state treasurer from 1776 to 1789, and director of the United States mint from 1792 to 1795. In 1791 he succeeded Franklin as president of the American philosophical society, to whose "Transactions" he had contributed many papers, and in 1795 he was chosen a fellow of the royal society of London.—See his life by William Barton (8vo, Philadelphia, 1813), and by Prof. James Renwick in Sparks's "American Biography."

RITTER, Carl, a German geographer, born in Quedlinburg, Aug. 7, 1779, died in Berlin, Sept. 28, 1859. He completed his studies at Halle, and in 1798 became tutor in the Bethmann-Hollweg family at Frankfort, and accompanied his pupils to the academy of Geneva, and to various countries. He was professor of history at the gymnasium of Frankfort in 1819-'20, and subsequently of geography at the university and military academy of Berlin. He created the science of general comparative geography. His most celebrated work is *Die Erdkunde im Verhältnisse zur Natur und Geschichte des Menschen*. At first it appeared in two volumes (Berlin, 1817-'18), but in the second edition the first volume (1822 *et seq.*) relates exclusively to Africa, and 18 volumes (1832-'59) to Asia. W. L. Gage has translated some of Ritter's work into English, under the titles "Comparative Geography" (Edinburgh, 1865) and "The Comparative Geography of Palestine and the Sinaitic Peninsula" (4 vols., 1866). Ritter also published *Europa, ein geographisch-historisch-statistisches Gemälde* (2 vols., Frankfort, 1807); *Die Stupas* (Berlin, 1838); and *Einleitung und Abhandlungen zu einer mehr wissenschaftlichen Behandlung der Erdkunde* (1852). After his death were published his *Geschichte der Erdkunde und der Entdeckungen* (1861), *Allgemeine Erdkunde* (1862), and *Europa* (1863). Among his biographers are Kramer in German (Halle, 1864) and Gage in English (New York, 1867).

RITTER, Heinrich, a German philosopher, born in Zerbst in 1791, died in Göttingen, Feb. 3, 1869. He studied at the universities of Halle, Göttingen, and Berlin, and was professor successively at all of them, at Göttingen for the last 32 years of his life. He was an eclectic in philosophy. His principal work is *Geschichte der Philosophie* (12 vols., Hamburg, 1829-'53; the part relating to ancient philosophy translated into French by Tisset, 4 vols., Paris, 1836-'7, and into English by A. J. W. Morrison, 4 vols., Oxford, 1838-'46; additional French translation by Trullard, 2 vols., 1843-'4). Among his other writings are: *System der Logik und Metaphysik* (2 vols., Göttingen, 1856); *Die christliche Philosophie* (2 vols.,

1858-'9); and *Encyklopädie der philosophischen Wissenschaften* (3 vols., 1862-'4).

RITUALISM, the science of the rites embodied in a ritual or book of rites. The term is popularly, though inaccurately, applied to a movement in churches of the Anglican communion, the three successive periods of which have been called by its opponents "Puseyism," "Tractarianism," and "Ritualism;" but its adherents assert it to be a catholic revival. The principles of ritualism as described by the latter are three. They say, in the first place, that it rests on the declaration set forth in 1571 by the same convocation of Canterbury which first required subscription to the thirty-nine articles: "that preachers should in the first place be careful never to teach anything from the pulpit, to be religiously held and believed by the people, but what is agreeable to the doctrine of the Old and New Testaments, and collected out of that very doctrine by the catholic fathers and ancient bishops." This is held to establish the doctrinal identity of the church of England with the primitive church, and has led to elaborate commentaries by ritualistic writers on Holy Scripture, and to the reproduction of patristic teaching on all leading points of faith and practice. The apostolic episcopate and sacramental grace are specially insisted on; baptismal regeneration is strenuously asserted; and the holy eucharist has been made the central object of teaching and the highest act of worship. The frequency as well as the splendor of eucharistic celebrations has steadily increased, and a fasting reception has been encouraged by early celebrations. The real presence of Christ in that sacrament—a presence spiritual as opposed to carnal, objective as opposed to the idea that it is only in the heart of the believer, and supralocal as opposed to the notion that it is contained within and limited to the species of bread and wine—has been incessantly advocated, until eucharistic adoration is now openly taught and practised. The voluntary use of private confession and absolution, as a preparation for the reception of the holy communion, has also made considerable progress. The second great principle of the ritualists is thus stated in the 30th canon of the English church: "So far was it from the purpose of the church of England to forsake and reject the churches of Italy, France, Spain, Germany, or any such like churches, in all things which they held and practised, that, as the apology of the church of England confesseth, it doth with reverence retain those ceremonies which do neither endanger the church of God nor offend the minds of sober men; and only departed from them in those particular points wherein they were fallen both from themselves in their ancient integrity, and from the apostolical churches which were their first founders." This principle, it is alleged, establishes the fraternal readiness of the church of England for visible reunion with other branches of the apostolic church. The ritualists assert,

therefore, that they are willing to do any and everything lawful to approximate toward the continental churches, from which the Anglican communion is now severed. The third fundamental principle of ritualism is found in the ornaments rubric, which has stood in the English prayer book, almost unaltered, from the beginning of the English reformation: "The chancels shall remain as they have done in times past. And here it is to be noted, that such ornaments of the church and of the ministers thereof, at all times of their ministration, shall be retained and be in use as were in this church of England, by the authority of parliament, in the second year of the reign of King Edward the Sixth." By this law, it is thought, the chancels as well as the vestments and "ornaments of the church and of the ministers thereof" should be precisely the same now as they were before the reformation, no change in them having been made in the second year of Edward. In the case of *Liddell v. Westerton*, the judicial committee of the privy council interpreted the law to refer to the rubrics of Edward the Sixth's first book, which did not come into use till Whitsunday in the third year of his reign. That rubric, in the "Order for administering the Supper of the Lord and the Holy Communion, commonly called the Mass," reads as follows: "Upon the day and at the time appointed for the ministration of the holy communion, the priest that shall execute the holy ministry shall put upon him the vesture appointed for that ministration, that is to say, a white albe plain, with a vestment or cope. And where there be many priests or deacons, there so many shall be ready to help the priest in the ministration as shall be requisite; and shall have upon them likewise the vestures appointed for their ministry, that is to say, albes with tunicles." A further rubric of the same book orders: "Whensever the bishop shall celebrate the holy communion, or execute any other public office, he shall have upon him, besides his rochet, an albe and cope or vestment, and also his pastoral staff in his hand, or else borne by his chaplain." As, in the opinion of ritualists, the three leading principles of the so-called catholic revival thus bind together the present church of England with the primitive, the mediæval, and the continental churches, they profess to give prominence to everything which helps to make this union real, without violating their clear obligations as members of the church of England. There are six chief points depending more or less closely on the principles laid down: 1, the eastward position of the celebrant in the sacrament of the holy communion, with his back to the people; 2, the eucharistic vestments; 3, lights burning at the time of the celebration; 4, incense; 5, the mixed chalice, a little water being added to the wine; 6, unleavened (or wafer) bread. The opponents of these usages have attempted to proscribe them through prosecutions in the English ec-

clesiastical courts. In the case of *Liddell v. Westerton* (1867), it was decided "that the same dresses and the same utensils, or articles, which were used under the first prayer book of Edward the Sixth, may still be used;" which left the ritualists in possession of the field. Suits were subsequently instituted against Mr. Macconochie (1868) and Mr. Purchas (1870), the latter of which was not defended. All the six above mentioned usages and some others were condemned by the highest court of appeal. The advocates of ritualism protested against the decision, which in their view impaired the authority of the court, and parliament has since provided for the establishing of a different tribunal for the hearing of ecclesiastical appeals. One decision, condemning the eastward position, was protested against in writing by about 5,000 of the clergy of the established church. Of more importance than these cases was that of the Rev. W. J. E. Bennett, vicar of Frome, who published a sermon in which he taught "the real and actual presence of our Lord, under the form of bread and wine, upon the altars of our churches." He stated "the three great doctrines on which the Catholic church has to take her stand" to be: "1, the real objective presence of our blessed Lord in the eucharist; 2, the sacrifice offered by the priest; 3, the adoration due to the presence of our blessed Lord therein;" adding: "I am one of those who burn lighted candles at the altar in the daytime; who use incense at the holy sacrifice; who use the eucharistic vestments; who elevate the blessed sacrament; who myself adore, and teach the people to adore, Christ present in the sacrament, under the form of bread and wine; believing that under their veil is the sacred body and blood of my Lord and Saviour Jesus Christ." The court of arches, through Sir Robert Phillimore (who said that if he pronounced otherwise he "should be passing sentence, in his opinion, upon a long roll of illustrious divines"), having decided in Mr. Bennett's favor, his prosecutors appealed to the judicial committee of the privy council (1872), which, although manifesting a strong animus against Mr. Bennett and Sir Robert Phillimore, dismissed the appeal. Encouraged by this doctrinal victory, the English ritualists have announced their determination to persevere until they have recovered what they consider their rightful heritage as a true branch of the Catholic church, in accordance with the professed principles, canons, and rubrics of the reformed church of England, as illustrated by the facts of her history. While devoting close study to holy writ, they have investigated the questions of liturgies and ritual in all ages of the church, especially the reformation era, have taken the lead in hymnology, and have produced many manuals and catechisms for the promotion of personal devotion. They have encouraged the revival of religious orders, mainly for works of charity; and there are many communities

of women who under their rule have devoted themselves to life-long labor in hospitals and similar institutions, for the love of God and their neighbor. An evangelist brotherhood of preachers has also been formed, who devote themselves to the holding of missions in cities and towns. In this country there is more or less of sympathy with the English ritualistic movement, but with much less development of detail. The attempts made in the general conventions of 1863, 1871, and 1874 to legislate against various usages regarded as ritualistic, were all defeated. In 1874 a general canon was passed (by many considered to be unconstitutional), which was regarded as a nearly unanimous expression of opinion unfavorable to ritualistic extremes; but no occasion has arisen in any diocese for putting it in force.

RIVAROL, Antoine, a French author, born at Bagnols, Languedoc, June 26, 1753, died in Berlin, April 13, 1801. After preparing himself for the church he became a private tutor at Lyons. In 1777 he went to Paris, where he assumed after his mother the name of chevalier de Parcieux, and next that of Count Rivarol. He led a dissipated and adventurous life, and acquired celebrity as a wit, satirist, journalist, poet, and miscellaneous writer. He defended Louis XVI., who had given him a pension of 4,000 livres, and in 1792 fled to Brussels. He afterward went to London and Hamburg, and in 1800 to Berlin on a mission from the future Louis XVIII. His principal works are: *Discours sur l'universalité de la langue française* (1784); *Petit almanach de nos grands hommes* (1788); and *Vie politique de Lafayette* (1792). Chénédolle and Fayolle edited his works under the title *Esprit de Rivarol* (5 vols., 1808).—His wife, an English woman, wrote *Notice sur la vie et la mort de M. de Rivarol* (2 vols., Paris, 1802). See also *Rivarol, sa vie et ses ouvrages*, by M. de Lescure, accompanying a select edition of his works (1862).

RIVAS, Ángel de Saavedra, duke of, a Spanish poet, born in Cordova, March 1, 1791. After advocating constitutional government in the cortes, he was exiled from 1823 to 1834. In 1836 he became minister of the interior in the government of Isturiz, which was soon driven from power by the revolutionary movement of La Granja. He was again banished by Espartero in 1837, but returned with Queen Maria Christina in 1843, and was ambassador to Naples till 1848. In 1854 he belonged to the short-lived cabinet which was overthrown by O'Donnell. Next he was ambassador in Paris, and in 1864 he presided for some time over the council of state. His principal works include, besides tragedies and comedies, *Ensayos poéticos* (2 vols., Madrid, 1813); *Florinda*, an epic poem on the Moorish conquest (1824-'5); *Romances históricos* (2 vols., Paris, 1840-'41); *El Moro espósito*, an epic poem (2 vols., 1844); and *Historia de la sublevación de Nápoles* (2 vols., Madrid, 1848; French translation by D'Hervé de Saint-Denis, Paris, 1849).

RIVE-DE-GIER, a town of France, in the department of Loire, on the Gier, an affluent of the Rhône, 12 m. N. E. of St. Etienne; pop. in 1872, 13,946. It has blast furnaces and forges, and steam engines, steel, glass (chiefly bottles of fine quality), and ribbon are manufactured. Near it are silk mills, extensive coal fields, and the reservoir of the Givors canal.

RIVER HOG. See **WART HOG**.

RIVES, William Cabell, an American statesman, born in Nelson co., Va., May 4, 1793, died near Charlottesville, Va., April 26, 1868. He was educated at Hampden Sidney and William and Mary colleges, and studied law. In 1816 he was a member of the state constitutional convention; and from 1817 to 1819, and in 1822 of the state legislature. In 1823-'7 he was a representative in congress, and in 1829-'32 minister to France. He was elected United States senator in 1832, and resigned in 1834, but was reelected in 1835 and again in 1840, serving till 1845. He was again minister to France from 1849 to 1853. In 1861 he was a member of the peace conference which met at Washington in February, and before the inauguration of Mr. Lincoln as president he with others had a special interview with him to consult upon the means of averting civil war. Mr. Rives was a member of the confederate provisional congress at Montgomery, Ala. He published "Life and Times of James Madison" (3 vols., Boston, 1859-'69).

RIVIERE, Briton. See supplement.

RIVINGTON, James, a royalist printer of New York during the revolution, born in London about 1724, died in New York in July, 1802. Early in life he was a bookseller in London, and acquired a fortune, which he lost at Newmarket. In 1760 he settled in Philadelphia, and in 1761 opened a book store in New York. On April 22, 1773, he established the "New York Gazetteer, or the Connecticut, New Jersey, Hudson's River, and Quebec Weekly Advertiser," in which he advocated the cause of the English government with great zeal. In November, 1775, in consequence of his constant assaults upon Capt. Isaac Sears and other republicans, that officer came from Connecticut with 75 horsemen to New York, destroyed Rivington's press, and converted the types into bullets. In October, 1777, the city being occupied by the British, he resumed the publication of his paper under the old title, which was not long after changed to "Rivington's New York Royal Gazette," and on Dec. 13 to the "Royal Gazette." About 1781, when the success of the British was becoming very doubtful, he played the part of a spy, furnishing Washington with important information. His communications were written on very thin paper, and conveyed to the American camp in the covers of books. After the evacuation of New York Rivington was allowed to remain, much to the general surprise. He took down the royal arms from his paper and changed the title to "Rivington's

New York Gazette and Universal Advertiser." His business however having rapidly declined, his paper was soon stopped (1783), and he passed the remainder of his life in poverty.

RIVOLI, a village of Venetia, Italy, in the province and 12 m. N. W. of the city of Verona, on the W. bank of the Adige; pop. about 1,000. It is memorable for the victory gained here by Bonaparte, Jan. 14, 15, 1797, over the Austrian general Alvinczy, who was marching to the relief of Mantua. This action, in which Joubert and Masséna bore an important part, decided the campaign. The Austrians lost 20,000 prisoners, Mantua surrendered, and the French were enabled to dictate terms at Campo Formio. For his services in this battle Masséna was in 1807 made duke of Rivoli.

RIYAD, or **Riad**, a city of Arabia, capital of the sultanate of Nedjed, in the province of Aared, lat. 24° 38' 34" N., lon. 46° 41' 48" E.; pop. estimated by Palgrave in 1862 at 40,000. It is a nearly square walled town, lying in an open valley, and surrounded by green fields, palm groves, and well watered gardens. It is divided into four quarters, but there is no separation otherwise than by broad streets. The N. E. quarter contains the palaces of the royal family and the houses of state officers and of the richer class; the N. W., an irregular mass of houses, is inhabited chiefly by those who are not strict Wahabees; the S. W., which is spacious and clean, is the chosen abode of the Wahabee orthodoxy; and the S. E., called Khazik (crowded), the worst built part of the town, is the home of the lower classes. The central point where these divisions meet is the market place, with the royal palace on one side and the great mosque on the other, the two being connected by a covered way. The remainder of the square is surrounded by the shops of tradesmen and artisans. Besides the great mosque, a large flat-roofed building capable of holding 2,000 persons, there are 30 or more smaller mosques in the several quarters. The palace is a mass of buildings, generally three stories in height, occupying a parallelogram surrounded by high walls, defended by bastions and towers, and having a dry moat around two thirds of its circuit. The walls of the city, which vary from 20 to 30 ft. in height, are massive and strong, and are defended by a deep trench and embankment. Riyad is the great centre of Wahabism, and all its residents are obliged to conform to the strict rules of the faith. Every morning and evening the names of those whom vicinity obliges to attend prayers are read over in the several mosques, so as to insure presence and detect absentees. The pilgrim route from Persia to Mecca and Medina passes through Riyad. It has been the capital of Nedjed since 1818, when Derayeh, the ancient capital, was destroyed by Ibrahim Pasha.

RIZZIO, **Ritzio**, **Riccio**, or **Ricci**, **David**, a favorite of Mary, queen of Scots, born in Piedmont about 1533, assassinated in Edinburgh, March

9, 1566. He was the son of a poor musician of Turin, went to the court of the duke of Savoy, and thence to Scotland in the suite of an ambassador, who selected him because he was a good linguist. He was made by Mary one of her pages, and after the removal of Raulet he became, in December, 1564, her secretary for the French language. All her foreign correspondence passed through his hands, and upon her marriage with Darnley he was appointed keeper of the privy purse. Darnley attributed Mary's unwillingness to give him the power as well as name of king to the influence of Rizzio, with whom she was also suspected of an illicit intimacy. The favorite's rapid promotion, his arrogance, avarice, and low birth, had aroused the envy and anger of the nobles. By the Protestants he was viewed with disfavor on account of his religion. An agreement, partly written and partly verbal, was entered into by Darnley, Morton, Maitland, Ruthven, Lindsay, and others, for putting Rizzio to death. Just before the execution of the design, Darnley was required to sign another bond in which he gave his assent to whatever they should do. In the evening, while the queen was at supper in company with the countess of Argyll, a few courtiers, her French physician, and Rizzio, the apartment was filled by the armed conspirators. Darnley held the queen, who was in an advanced state of pregnancy; Rizzio cowered behind her and held on to her dress. One or two of the assassins stabbed him in the body, and then dragging him into the antechamber despatched him with more than 50 wounds.

ROACH, a fish of the carp family (*cyprinidæ*) and genus *leuciscus* (Klein). The generic characters have been given under **DACE**. The common roach of Europe (*L. rutilus*, Klein) attains a length of 10 to 15 in.; the upper part of the head and back is dusky green with blue reflections, lighter on the sides, and silvery white below and on the cheeks; the pectorals orange red, ventrals and anal bright red, and the dorsal and caudal pale brown tinged with red. The muzzle is rather sharp, and the



European Roach (*Leuciscus rutilus*).

mouth small with soft lips; there are hooked teeth in the pharynx, and the abdomen behind the ventrals is somewhat keeled; there is a single dorsal in the middle of the back, over the ventrals, which, with the anal, has no bony ray; the nape and back rise suddenly; the

scales are large, with concentric and radiating lines, 43 on the lateral line, which falls by a curve from the upper part of the gill cover below the middle of the body, and thence is nearly straight to the tail. It is found in large shoals in the still rivers and lakes of temperate Europe, and feeds on worms and aquatic plants; it is caught abundantly in the Thames, going high up the river in May or June to spawn, but is best for food and finest in color in October; yet it is not much esteemed. The beautiful dace of New England (*L. [leucosomus] pulchellus*, Girard) resembles the European fish, and hence is often called roach; this name is also applied to the bream (*pomotis vulgaris*, Cuv.).

ROAD, a solid pathway for the transportation of passengers and commodities. Roads are of various kinds, the degree of perfection to which they have been carried generally corresponding to the degree of civilization of the country where they are situated. The ancient Egyptians must have had hard paved roads on which to transport the immense blocks of stone used in building the pyramids and other structures. The Hebrews had roads at a very early period; the song of Deborah speaks of abandoned highways (Judges v. 6). The Greeks paid much attention to roads, but the greatest improvements, such as permanent pavements, are said to have been made by the more commercial Carthaginians. The Via Appia, called by Statius the queen of roads (see **APPIAN WAY**), the Via Aurelia (the Tyrrhenian coast road), and the Via Flaminia (see **FLAMINIAN WAY**) were the first great Roman roads, and the Roman empire soon became intersected with numerous paved roads constructed with great care at enormous expense. In many parts they have lasted till the present day. During the last Punic war a paved road was constructed from Spain through Gaul to the Alps. Similar roads were afterward made in every part of Spain and Gaul, through Illyricum, Macedonia, and Thrace, to Constantinople, and along the Danube to its mouths on the Black sea; and the islands of Sardinia, Corsica, Sicily, and Great Britain were crossed by them. Under Antoninus Pius (A. D. 138-'61) all the Roman military roads were surveyed, including six great roads in Egypt. In India good roads were made at an early period, connecting Agra with Lahore, and Lahore with Cashmere; but after the death of Aurungzebe they fell into decay, and the only good roads in India, it is said, have since been constructed by the British, who have carried a good and metalled road, called the Grand Trunk, from Calcutta to Peshawar on the borders of Afghanistan. The "metalling" (pavement of stone or concrete) of these roads is mostly composed of a calcareous nodule called *kunkur* found there, which when moistened and pounded into a crust nine inches or a foot deep forms an excellent pavement. The *kunkur* is sometimes ferruginous, which im-

proves its quality. In ancient Peru the Incas built great roads, the remains of which still attest their magnificence. The most remarkable were the two which extended from Quito (or in fact nearly 100 m. N. of Quito) to Cuzco, and on toward Chili, one passing over the grand plateau, the other bordering on the ocean. Humboldt, in his "Aspects of Nature," says of the mountain road: "But what above all things relieves the severe aspect of the deserts of the Cordilleras are the remains, as marvellous as unexpected, of a gigantic road, the work of the Incas. . . . In the pass of the Andes between Mausi and Loja we found on the plain of Puttal much difficulty in making a way for the mules over a marshy piece of earth, while for more than a German mile our sight continually rested on the superb remains of a paved road of the Incas, 20 ft. wide, which we marked resting on its deep foundations, and paved with well cut, dark porphyritic stone. This road was wonderful, and does not fall behind the most imposing Roman ways which I have seen in France, Spain, and Italy. By barometrical observation I found that this colossal work was at an elevation of 12,440 ft." Prescott says: "Galleries were cut for leagues through living rock; rivers were crossed by means of bridges that swung suspended in the air; precipices were scaled by stairways hewn out of the native bed; ravines of hideous depth were filled up with solid masonry; in short, all the difficulties that beset a wild and mountainous region, and which might appal the most courageous engineer of modern times, were encountered and successfully overcome. The length of the road, of which scattered fragments only remain, is variously estimated at from 1,500 to 2,000 m. Its breadth scarcely exceeded 20 ft. It was built of heavy flags of freestone, and in some parts at least covered with a bituminous cement, which time has made harder than the stone itself. In some places, where the ravines had been filled up with masonry, the mountain torrents, wearing on it for ages, have gradually eaten a way through the base, and left the superincumbent mass—such is the cohesion of the materials—still spanning the valley like an arch."—The Britons failed to keep up the roads made by the Romans, or to construct new ones, and for centuries they used bridle paths, or at most narrow passages for small carts; and not till the 16th year of the reign of Charles II. was there any attempt by the government to improve the roads. The first turnpike road was then established by law; but it was not till about a century ago that a system of good roads was established. Up to that time goods were conveyed in Scotland on pack horses. In 1770 the journey from Liverpool to Manchester, according to the account of Arthur Young, was not a little perilous from the bad condition of the road. But within the next 60 years, when the manufacturing resources of the country, through the introduction of the steam engine

and the extensive use of coal, were developed, the progress in road making was rapid. In the United States the importance of roads for military purposes, leading into the interior territories and to the frontier, was early appreciated, and some important routes were opened by the general government; as the national road from Baltimore, through Wheeling and Cincinnati, to St. Louis, and that from Bangor to Houlton in Maine. The making of turnpike roads by chartered companies, before the general introduction of railroads, often yielded much profit to capitalists. Most of the paved road was constructed upon the Macadam principle. Several public turnpikes have been constructed in parts of New York and in the western states with planks; but they have not proved successful, as the exposure to air and moisture causes them to decay rapidly.—In laying out a new road, the general system resembles that for the construction of railways, but an equal expense in securing level grades is not usually justifiable. It is found that upon a slope of 1 in 44, or about 120 ft. to the mile, a horse can draw only three fourths as much as he can upon a level; on a slope of 1 in 24, or 220 ft. to the mile, only half as much; and on a slope of 1 in 10, or 528 ft. to the mile, only one fourth as much; but these proportions vary with the condition of the road, because when the road is soft the grade is virtually increased. The harder and firmer and smoother the surface of a road is, the less resistance it will offer to a passing wheel; and for this reason elastic road beds are inferior for the transportation of heavy loads. It is usually estimated that the greatest inclination down which horses may trot with safety is, for roads paved with blocks, 1 in 60; for macadamized roads, 1 in 35 or 40; and for gravel or dirt roads, 1 in 15. In regard to the surface of a transverse section of a road, there has been considerable debate, some maintaining that it should be nearly straight, and that the drainage should be secured when practicable by longitudinal grading, the reason being that ease of draught on a convex road requires the wagon to be in the middle of the track. The weight of authority seems to be in favor of raising the track in the middle, but not to such a degree as to cause much inclination of the wagon. On roads where there is much traffic, so that wagons are continually meeting and passing, inclination may be avoided by having two tracks, each raised in the middle. To allow the water to run longitudinally upon a road bed for any considerable distance will certainly cause any macadamized or stone pavement to get out of order, from washing or undermining, unless it is laid in hydraulic cement, or asphalt of sufficient firmness to resist the action of a rapid current of water. In regard to the formation of the road bed there are two systems, that of Telford and that of Macadam. The system of Telford is principally a revival of that employed by the

old Romans, and also adopted by Trésaguet in France in 1760, but discarded in 1816 by Macadam, who substituted small angular broken stones, laying them directly upon the earth. (See PAVEMENT.) Telford made a return to the system of laying heavy stones at the bottom of the bed and covering them with a coating of broken stones. Several excellent roads were constructed by him in Great Britain, the permanence of which is evidence of his engineering wisdom, such as that between Holyhead and Shrewsbury, and the Glasgow and Carlisle road. Macadam preferred a yielding to a rigid foundation, and even laid broken stone upon boggy ground. The angular shape of the stones caused them to bind together somewhat, but the superiority of roads having large stones or concrete (which is preferable since the manufacture of hydraulic cements has become so general) for a foundation is now generally conceded. The kind of stone most suitable for a road bed is a matter of importance; for macadamized roads, granite or basaltic rock, covered with sandstone or argillaceous shale, is to be preferred. Slate rock in various degrees of hardness may often be employed with advantage as a surface covering as well as a filling in many kinds of pavement where hydraulic cement is not relied on to produce firmness. Of the drainage of a road not much need be said, as it is evident that it should be comparatively dry, and not subject to inundation. A ditch at one or both sides, when the land does not slope away, is almost always necessary, and culverts to lead the water from one side to the other. In carrying a road over a hilly country it is usual to wind around the sides of hills and mountains, and an inclined plane of considerable length often becomes necessary. A ditch upon one side, with frequent culverts, should be constructed; but it is sometimes the practice on turnpikes built by companies, and where the income of the road would not justify the outlay for construction and repair of culverts, to make diagonal elevations across the track at frequent intervals to direct the water off the road. If they are placed too far apart, the water is suffered to gather too much headway and thus wear away the road bed. It is this accelerated movement of water in the ditches of a road running down hill that makes it so difficult to construct culverts which shall receive the current and conduct it away without damage to the banks along the roads.—Public roads are laid out, constructed, regulated, and kept in repair by public authority. Private property is taken for the construction of roads upon allowance of just compensation to the owner. The system of making assessments for repairs varies in the different states. Generally all property owners in the town or county where the road lies are assessed. In many of the states all male inhabitants 21 years old or over are required to labor on the roads a specified number of days each year, but a

substitute may be furnished or commutation be made in money. Females are subject to a property but not to a labor assessment. In large cities special regulations generally prevail.—Among the most important works relating to roads are Macadam's "System of Road-making" (London, 1825); Parnell's "Treatise on Roads" (1838); Telford's reports to parliament on the Holyhead road; Penfold "On Making and Repairing Roads" (1835); Poncelet, *Mécanique industrielle* (Paris, 1841); Morin, *Aide-mémoire de mécanique* (1843); Gayflier, *Manuel des ponts et chaussées* (1844); and Gillespie, "Roads and Railroads: a Manual for Roadmaking" (10th ed., New York, 1871).

ROANE. I. A W. county of West Virginia, intersected by branches of the Kanawha and De Kalb rivers; area, about 450 sq. m.; pop. in 1870, 7,232, of whom 23 were colored. The surface is generally hilly, and in the N. part mountainous, and the soil fertile. Iron ore and coal are found. The chief productions in 1870 were 24,087 bushels of wheat, 160,912 of Indian corn, 28,489 of oats, 4,732 tons of hay, 9,907 lbs. of tobacco, 26,828 of wool, 116,094 of butter, 6,922 of flax, and 28,836 gallons of sorghum molasses. There were 1,540 horses, 1,858 milch cows, 3,477 other cattle, 12,973 sheep, and 7,112 swine. Capital, Spencer. **II.** An E. county of Tennessee, intersected by the Tennessee river and drained by its branches, the Clinch and Holston; area, about 600 sq. m.; pop. in 1870, 15,622, of whom 2,128 were colored. Along the W. border is a range of the Cumberland mountains. The soil is generally fertile. The East Tennessee, Virginia, and Georgia railroad passes through it. The chief productions in 1870 were 74,814 bushels of wheat, 504,590 of Indian corn, 112,029 of oats, 1,671 tons of hay, 14,027 lbs. of wool, 163,394 of butter, and 13,080 gallons of sorghum molasses. There were 3,390 horses, 3,064 milch cows, 5,623 other cattle, 10,552 sheep, and 17,661 swine; 1 manufactory of cotton goods, 1 of pig iron, 9 of tanned and 8 of curried leather, 4 wool-carding and cloth-dressing establishments, and 5 saw mills. Capital, Kingston.

ROANNE, a town of France, in the department of Loire, on the left bank of the Loire, 40 m. N. W. of Lyons; pop. in 1872, 20,037. It is well built, and has fine promenades, a wide quay, and a stone bridge 620 ft. long, with seven arches. The town has a college with a library of about 10,000 volumes, a church of the 15th century, a city hall, dyeing establishments, tanneries, flax and cotton mills, and hat shops. It is celebrated for its mineral waters. A canal connects it with Digoin. It is the great entrepot for the product of the Loire coal fields. It contains numerous Gallo-Roman antiquities.

ROANOKE, a S. county of Virginia, intersected by Staunton river, bordered S. E. by the Blue Ridge and N. W. by a ridge of the Alleghanies; area, about 200 sq. m.; pop. in 1870, 9,350, of whom 3,132 were colored. It

occupies part of the great Virginia valley, and has a very fertile soil. It is traversed by the Virginia and Tennessee division of the Atlantic, Mississippi, and Ohio railroad. The chief productions in 1870 were 203,226 bushels of wheat, 86,943 of Indian corn, 89,558 of oats, 3,481 tons of hay, 280,550 lbs. of tobacco, 4,365 of wool, 120,980 of butter, and 4,600 gallons of sorghum molasses. There were 1,846 horses, 5,075 cattle, 2,208 sheep, and 7,344 swine. Capital, Salem.

ROANOKE RIVER. See NORTH CAROLINA, vol. xii., p. 489.

ROBBERY, in law, a felonious taking of money or goods, of any value, from the person of another or in his presence, against his will, by violence or putting him in fear. The characteristic feature of this offence, and that which makes the distinctive difference between it and simple larceny from the person (or between a robber and a cutpurse or common thief), is the violence and fear attending its perpetration; and therefore it makes no material difference whether the thing taken be of great or small value, though it must be of some real value, for otherwise it is no larceny and consequently no robbery; and there must also be an actual taking of something, for the violence and putting in fear alone would amount only to an assault. It is not necessary that the money or property should be taken directly from the person or manual possession of the owner in order to constitute this offence. If it be taken in the actual presence of the owner, and violence be offered to his person, or he be put in fear for the purpose of accomplishing such a taking, this amounts to the same thing; as if, for instance, a robber should assault a man and command him to deliver up his purse, but instead of doing so the owner should throw it away from him, and the robber should then pick it up and carry it off in his presence, this would be as much a robbery as if he had taken it from the owner's person. The robber must have obtained actual possession of the property, but it is not material that such possession should continue; and though for any reason the robber should return the money stolen the next moment after receiving it, either absolutely or conditionally, yet this will not alter the crime, or render its consummation less complete. A sudden snatching of a thing from the hand or person of another is not such a taking by force and through fear as will constitute robbery, unless it occasions either an injury to the party from whom it is snatched, or a struggle for the possession of the property taken; for here there is no putting in fear; and though a certain degree of force may be used, the theft is accomplished rather without than against the consent of the owner, and more by the dexterity of the thief and the sudden surprise of the party than by open force and terror. But where an ear ring was so suddenly pulled from a lady's ear that she had neither time nor opportunity for resistance, it being done with such violence

that her ear was entirely torn through, the perpetrator was held guilty of robbery. The violence and putting in fear, moreover, must precede the taking. If a man quietly steal anything from the person, though he afterward retain possession of it by violence or by intimidating the owner, this is not robbery; for the fear is subsequent to the larceny, and no violence subsequently used, even with respect to the same thing, will operate so as to convert that into robbery which was before only larceny. But if a man be knocked down without any previous warning, and then stripped of his property while senseless, though he could not properly be said to have been previously put in fear, yet it would be a robbery. If the violence be fraudulently used under color of some legal proceeding; or if money be forcibly extorted under pretence of a purchase or sale; or if a man beg in a menacing manner, as with a drawn sword in his hand, and receive alms from the party through the apprehensions regarding his personal safety which the appearance and actions of the beggar naturally excite in his mind; in all these cases it will still be robbery. Thus, where the prisoner forcibly took a bushel and a half of wheat worth 8s. from a woman, and compelled her to accept 13d. for it, threatening to kill her if she refused, this was held to be robbery by all the judges in England. It is not necessary that the delivery of the money or goods should be contemporary with the violence or the immediate effect of it; as, if a robber, finding but a small sum of money about a man's person, compel him to swear under a threat of death in case of non-compliance to bring him a larger sum, which the man does, this is robbery, because the terror caused by such a menace is upon him at the time of his making the payment, and was the cause of his doing so.—The payment of money or delivery of goods by the owner, under the fear of having his property destroyed, is robbery in the receiver. And it is an important rule that the violence is sufficient to make the crime robbery, although it consist entirely of a threat to disgrace a person. The fear arising from a menace of accusing one of a dreadful crime which would endanger his personal safety, or lead to the loss of his character or situation, is equivalent to the fear of personal and immediate violence; and to extort money by such means is robbery. But the fear thus excited must not only be such as will suffice to influence or even to constrain the ordinary action of the will; it must entirely and immediately control and overpower it, and render the person incapable through terror or confusion of resisting the demand. For this reason, in a case where the prosecutor, who was threatened with having such a charge made against him unless he complied with the prisoner's demand, did not part with his money immediately upon the threat being made to him, but on the contrary did so after the person making the threat had left him, and af-

forded him sufficient time in which to consider the matter, and apply for assistance if he desired so to do, and after he had consulted with a friend who was actually present when he paid the money, here it is considered that the prosecutor was not impressed with such terror as to render him incapable of resisting the demand; that there was not the continuing fear which could operate *in constantem virum* from the time when the money was demanded until it was paid; and consequently there was neither the actual nor constructive violence which was necessary to constitute the crime of robbery. Further, it is not necessary that the fear should be of violence to the person robbed. If the threat is made against a man's wife or child, or other person to whom he is bound by ties of blood and affection, and he gives money to the robber for the sake of saving such person from immediate danger or violence, this would be as much a robbery as if the violence were offered to himself. Neither is it necessary that the robbery should be the sole and original motive of the person making use of the violence, if the violence so used led to this result; as, where a man feloniously assaulted a woman, who, without any demand on his part to that effect, offered him money, which he took, yet continued to treat her with violence, for the accomplishment of his original purpose, until interrupted by the approach of others, this was held to be a robbery; for the woman, terrified by the prisoner's behavior, offered the money to save herself from further violence, which otherwise she would not have given voluntarily.—It was a principle of the common law that no restitution of stolen goods could be awarded upon an indictment, inasmuch as it was at the suit of the king only, and the owner could only obtain restitution by an appeal of robbery, which was the suit of the party; but this has long fallen into disuse, and subsequent statutes have remedied the defect. Formerly, when a robbery or other felony had been committed in England, a hue and cry should be raised, which was the old common law process of pursuing with horn and with voice all felons. In this hue and cry all persons, both officers and private individuals, were called upon to join; and no hue and cry was deemed sufficient unless made with both horsemen and footmen. In order that such hue and cry should be more effectually made, the hundred was bound to answer for all robberies therein committed unless they captured the felon; and this responsibility is the foundation of the ancient action against the hundred for any loss by robbery. If the robber was taken, the hundred stood excused; but otherwise the party robbed was entitled to prosecute it by a special action on the case for damages equivalent to his loss. In order further to encourage the apprehending of robbers, certain rewards were offered to such as would bring them to justice, by various acts of parliament, one of which enacted "that such as

apprehend a highwayman and prosecute him to conviction shall receive a reward of £40 from the public, to be paid to them by the sheriff, together with the horse, furniture, arms, money, and other goods taken upon the person of such robber, saving only the rights of any persons from whom the same may have been stolen."—Robbery has always been considered an aggravated crime, especially when committed with dangerous or deadly weapons, and was formerly punished with great rigor and severity. Until comparatively recent times it was indeed punished with death, here as well as in England, even though the amount stolen would, if unaccompanied by violence, have constituted only petit larceny. This was the rule of the common law; but the progress of civilization, restricting capital punishment to a few crimes, has modified the penalty for robbery, as a general thing, to imprisonment for life, or for a term of years, according to the particular circumstances and degree of the crime.

ROBERT GUISCARD. See GUISCARD.

ROBERT I., king of Scotland. See BRUCE.

ROBERT, Louis Léopold, a French painter, born in La Chaux-de-Fonds, Switzerland, May 13, 1794, died in Venice, March 20, 1835. At first he applied himself to engraving, and subsequently to painting under the instruction of David and Gérard. In 1818 he went to Rome, where he pursued his art with singular enthusiasm. He was a laborious painter, rejecting picture after picture which seemed to him unequal to the subject, and occupying in some instances years upon a single work. His productions are few, but in the delineation of Italian life are unrivalled in modern art. His masterpieces are the "Reapers," the "Neapolitan Improvisatore," the "Madonna dell' Arco," and the "Fishermen of the Adriatic." He conceived a romantic but hopeless passion for a beautiful woman of rank, under the influence of which he committed suicide.—See *Léopold Robert, sa vie, ses œuvres et sa correspondance*, by Feuillet de Conches (Paris, 1862).

ROBERT, Louis Valentin Éllas, a French sculptor, born in Étampes about 1818. He studied under David d'Angers, and has produced "France crowning Art and Industry," a colossal group on the palace in the Champs Élysées (1855), four caryatides for the opera at Philadelphia (1857), several for the new Paris opera opened in 1875, a bust of Houdon in the Louvre, a statue representing the drama, busts for the Châtelet theatre, and a bronze statue of Justice which decorates the fountain of St. Michel in Paris.

ROBERT-FLEURY, Joseph Nicolas, a French painter, whose real name is Fleury, born in Cologne, Aug. 8, 1797. He studied under Vernet and Gros, and exhibited his first piece in 1824. Among his works are: "Tasso in the Convent of St. Onofrio," "An Incident of the St. Bartholomew Massacre," "The Last Moments of Montaigne," "The Entrance of Clovis into Tours," and "Jane Shore." One of his finest productions, "Charles V. at the Mon-

astery of San Yuste," was again exhibited in 1867. He has been professor, and for five years director, of the school of fine arts in Paris, and in 1865-'6 of the French academy in Rome. His son Tony is a historical painter.

ROBERTS, David, a British artist, born at Stockbridge, near Edinburgh, Oct. 24, 1796, died in London, Nov. 25, 1864. In early life he was a house painter, and upon removing to London in 1821 he devoted himself for several years to scene painting. In 1832-'3 he visited Spain, and upon his return published a volume of lithographic copies of "Picturesque Sketches in Spain" (1837). In 1838-'9, during a tour through Syria and Egypt and other eastern countries, he made a number of drawings, published as "The Holy Land, Syria, Idumæa, Arabia, Egypt, and Nubia" (4 vols. fol., 1842-'8). In 1841 he was elected a royal academician, and subsequently produced a number of views of celebrated places, with architectural and other accessories, including "Ruins of the Great Temple of Karnak," "Jerusalem from the Mount of Olives," "Rome," "Interior of the Cathedral at Burgos," "The Chancel of the Collegiate Church of St. Paul at Antwerp," &c. His works also include such subjects as the "Destruction of Jerusalem," and the "Inauguration of the Exhibition of all Nations," painted for the queen. At his death he left in his studio 73 oil paintings and sketches and 800 water-color pieces, which were exhibited in 1865 and subsequently sold for £16,000.—See "Life of David Roberts, R. A.," by James Ballantine, illustrated with sketches by the artist (4to, Edinburgh, 1866).

ROBERTSON. I. A central county of Texas, bordered E. by the Navasoto river and W. by the Brazos, and drained by their branches; area, 840 sq. m.; pop. in 1870, 9,990, of whom 4,530 were colored. It has a rolling surface, covered with forest and prairie, and a generally fertile soil, with some very rich bottom lands. It is traversed by the Houston and Texas Central railroad. The chief productions in 1870 were 140,083 bushels of Indian corn, 1,385 lbs. of wool, and 4,833 bales of cotton. There were 897 horses, 1,854 milch cows, 8,648 other cattle, 5,156 sheep, and 7,817 swine. Capital, Calvert. **II.** A N. county of Tennessee, bordering on Kentucky, and drained by tributaries of Cumberland river; area, about 400 sq. m.; pop. in 1870, 16,166, of whom 4,813 were colored. It has an uneven surface and a generally fertile soil. The St. Louis and Southeastern railroad passes through it. The chief productions in 1870 were 161,114 bushels of wheat, 559,020 of Indian corn, 149,019 of oats, 19,295 of Irish and 27,455 of sweet potatoes, 2,103,322 lbs. of tobacco, 19,387 of wool, and 155,643 of butter. There were 3,908 horses, 2,461 mules and asses, 3,000 milch cows, 3,290 other cattle, 11,146 sheep, and 29,817 swine; 8 flour mills, 14 saw mills, and 12 distilleries. Capital, Springfield. **III.** A N. E. county of Kentucky, bounded N. by Shannon creek and S. W.

by Licking river, and drained by several tributaries of the Licking; area, about 175 sq. m.; pop. in 1870, 5,399, of whom 257 were colored. The surface is rolling and in some parts hilly; the soil is fertile. The chief productions in 1870 were 9,913 bushels of wheat, 11,176 of rye, 242,426 of Indian corn, 16,667 of oats, 1,648,201 lbs. of tobacco, 84,675 of butter, and 769 tons of hay. There were 1,931 horses, 961 milch cows, 1,213 other cattle, 2,289 sheep, and 5,412 swine. Capital, Mount Olivet.

ROBERTSON, Frederick William, an English clergyman, born in London, Feb. 3, 1816, died in Brighton, Aug. 15, 1853. His early inclinations were toward military life, but he entered Brasenose college, Oxford, where he graduated in 1840, and the same year took orders. He was curate successively at Winchester, Cheltenham, and Oxford; and in 1847 he became minister of Trinity chapel, Brighton, where his eloquence and originality always attracted a crowded and intellectual audience. He organized a working men's institute, before which he delivered several lectures. The violent denunciations of some of his religious opinions, acting on a naturally feeble constitution, hastened his death. He was the author of "Lectures on the Influence of Poetry on the Working Classes" (London, 1852; republished with additions under the title "Lectures and Addresses on Literary and Social Topics," 1858; new ed., 1861); "Sermons preached at Trinity Chapel" (four series, 1855-'63; new ed., with a memoir, 2 vols., Boston, 1870); and "Expository Lectures on St. Paul's Epistles to the Corinthians" (London, 1859). His "Life and Letters" have been edited by Stopford A. Brooke (2 vols., 1865).

ROBERTSON, James Cragie, a British clergyman, born in Aberdeen, Scotland, in 1813. He graduated at Trinity college, Cambridge, in 1834, took orders in the English church, in 1846 became vicar of Beaksbourne near Canterbury, and in 1859 was appointed canon of Canterbury. He was chosen professor of ecclesiastical history in King's college, London, in 1864, which chair, in conjunction with his canonry, he still holds (1875). His chief work, the first volume of which was published in 1853, is "History of the Christian Church, from the Apostolic Age to the Reformation" (revised ed., 8 vols. 8vo, 1874-'5). He has also published "How shall we conform to the Liturgy of the Church of England?" (1843; 3d ed., 1869); "The Bearings of the Gorham Case" (1850); "Becket, Archbishop of Canterbury, a Biography" (1859); and "Church History during the First Six Centuries" (12mo, 1869). He has edited for the ecclesiastical history society Heylin's "History of the Reformation of the Church of England" (1849), and for the Camden society Bargrave's "Alexander VII. and his Cardinals" (1866).

ROBERTSON, Thomas William, an English dramatist, born Jan. 9, 1829, died in London in February, 1871. He belonged to a theatrical

family, and began life as an actor in a strolling company, of which his father was the manager. His first original drama, "A Night's Adventure," was brought out at the Olympic in 1851. He settled in London in 1860, supporting himself by light literature. His "David Garrick," adapted from the French, attracted general notice in 1864, chiefly owing to the acting of Sothorn. His "Society," produced at the opening of the Prince of Wales's theatre in 1865, made him famous, and was followed by "Ours" (1866), "Caste" (1867), "Play" (1868), "School" (1869), and "M. P." (1870). His last play was "War," produced at the St. James's Theatre.

ROBERTSON, William, a Scottish historian, born at Borthwick, Edinburghshire, Sept. 19, 1721, died at Grange house, near Edinburgh, June 11, 1793. He graduated at the university of Edinburgh in 1741, was licensed to preach, and in 1743 was presented to the living of Gladmuir in Haddingtonshire. In 1745 he volunteered to serve in the army against the pretender. In the general assembly of the church of Scotland he was one of the leading advocates of lay patronage, which at that time was the great dividing question. In 1757 he defended Home, who was persecuted by the ultra Calvinist party for writing the tragedy of "Douglas," and also the clergymen who had attended the theatre to witness its representation. In 1759 he was made chaplain of the garrison at Stirling, in 1761 a dean of the chapel royal, in 1762 principal of the university of Edinburgh and minister of the old Greyfriars, and in 1764 historiographer of Scotland with a salary of £200. About this time he entertained the project of writing the history of England; but after the resignation of Lord Bute, who had been his friend, he gave it up. His histories vie with those of his contemporaries Hume and Gibbon in diction and liberal sentiment, and surpass them in impartiality. They are: "History of Scotland during the Reigns of Mary and James VI." (2 vols. 4to, 1759); "History of the Reign of the Emperor Charles V." (3 vols. 4to, 1769); and "History of America" (2 vols. 4to, 1777); besides "An Historical Disquisition concerning the Knowledge which the Ancients had of India" (4to, 1791). His life was written by Dugald Stewart (8vo, 1801), and by Lord Brougham.

ROBERVAL, Gilles Personne or Personier de, a French mathematician, born at Roberval, near Beauvais, Aug. 8, 1602, died in Paris, Oct. 27, 1675. He went to Paris in 1627, became professor of philosophy in the college of Maître Gervais and of mathematics in the royal college, and was one of the members of the academy of sciences at its foundation in 1665. He early discovered a method of investigating problems similar to the "method of indivisibles," but kept it to himself in order to surpass his contemporaries in the solution of problems, and thus lost the honor of originating

it. A method of determining the direction of a tangent at any point of a curve, which Torricelli claimed to have made in 1644, Roberval, in a letter to Torricelli, declared was known to himself in 1636. Torricelli gave the name of Robervallian lines to curves with infinite branches which admit of an expression for the area between them. Roberval discovered rules for finding the volume of solids formed by the revolution of a cycloid about its base and about its axis. His principal works were published after his death in the old *Mémoires de l'Académie*, vol. vi. (1693).

ROBESON, a S. county of North Carolina, bordering on South Carolina, watered by the Lumber and Little Pedee rivers; area, about 900 sq. m.; pop. in 1870, 16,262, of whom 737 were colored. It has a nearly level surface and a generally sandy soil. It is intersected by the Carolina Central railroad. The chief productions in 1870 were 5,838 bushels of rye, 138,545 of Indian corn, 21,261 of peas and beans, 84,784 of sweet potatoes, 69,486 lbs. of rice, 14,081 of wool, 25,199 of honey, and 2,109 bales of cotton. There were 1,152 horses, 741 mules and asses, 2,915 milch cows, 6,469 other cattle, 8,396 sheep, and 18,751 swine; 1 saw mill, and 15 establishments for the production of tar and turpentine. Capital, Lumberton.

ROBESPIERRE, Maximilien Marie Isidore de, a French revolutionist, born in Arras, May 6, 1758, executed in Paris, July 28, 1794. He was supposed to be of remote Irish origin, and his ancestors had acquired patents of nobility in France. His mother died young, and his father deserted his family and ended his life in Germany. His grandfather placed him at the college of Arras, and M. de Conzié, the bishop, sent him in 1770 to the college of Louis le Grand in Paris. Danton, Desmoulins, and Fréron the younger were among his fellow pupils. He repeatedly gained honorable distinction in his studies, and remained at this institution eight years. After completing his law studies he returned to Arras, where his first important cause was a defence of the introduction of Franklin's lightning rods against the charge of impiety (1783). He became a member of the criminal court of Arras, and in the discharge of his duties was called to condemn a prisoner to death. This so affected him that he resigned his office and advocated the abolition of capital punishment. He was thoroughly imbued with the theories of Rousseau, and gradually espoused the cause of the people in opposition to the clergy and nobility. On the convocation of the states general in 1789, he was elected deputy of the third estate. Lamartine describes his figure as slight; limbs feeble and angular; voice shrill and monotonous; forehead small and projecting over the temples; eyes blue and deeply set; nose straight and small, and very wide at the nostrils; mouth large and lips thin; chin small and pointed; complexion yellow and livid. There was a prodigious and continual tension of all the muscles

of his face. In the constituent assembly he strenuously opposed giving the king a suspensive veto power, resisted the decree of martial law, pleaded for the remission of sundry disabilities against the Jews and comedians, and advocated abolition of the compulsory celibacy of priests. After the adoption of the declaration of the rights of man he was continually recalling the assembly to the principles of that formula. On June 19, 1790, he was elected one of its secretaries. He had no means beyond his pay as deputy, 18 francs a day, of which he sent one fourth to his sister. He occupied a retired and ill furnished lodging, and Michelet describes him as entering the tribune dressed in a threadbare olive-green coat, his only one. After Mirabeau's death (April 2, 1791), Robespierre rose to a more commanding position. He was studious and abstemious, and constant in attendance at the Jacobin club and the assembly. He at length began to be feared. Duport and Bigot, who had been named president and vice president of the criminal tribunal, with Robespierre for public accuser, refused to serve on account of his extreme views. This office he held from June, 1791, till April, 1792. He thought that "in general there is nothing so just nor so good as the people, when not irritated by the excesses of despotism." He still advocated the abolition of capital punishment, and the admission of all citizens into the national guards and upon juries. He claimed for the blacks in the colonies a participation in political rights, and exclaimed: "Let the colonies perish rather than a principle." He was one of the leaders of the mob in the riot of July 14 and 17, 1791, intended to overawe the assembly and drive it into accepting the abdication of the king, and showed himself a coward on this occasion. At the close of the constituent assembly, Sept. 30, 1791, the people of Paris received him with rapture. By a decree of the assembly, proposed by Robespierre, no member was eligible to the next legislature which convened on the dissolution of its predecessor. He took advantage of the occasion to revisit his native town, where he was welcomed with an ovation. After seven weeks' rest he returned to Paris, and during the sitting of the legislative assembly was in constant attendance upon the meetings of the Jacobin club. When the assembly voted a sum for martial preparations, he alone opposed the measure. He began in the spring of 1792 a journal entitled *Le défenseur de la constitution*, which closed with the 12th number. In the conspiracy which culminated in the bloody events of Aug. 10 he does not appear to have participated, though he afterward spoke of that day as one of the most glorious in the annals of the world. He was made one of the new municipality following this insurrection, and a day or two afterward appeared before the assembly as the spokesman of a deputation from the commune to demand the establishment of a new criminal court for the summary

trial of the enemies of liberty. This court, afterward remodelled as the revolutionary tribunal, was promptly organized, and Robespierre was named for presiding judge; but he declined, on the ground that it was not just for him to be judge of those whom he had already denounced as enemies of the country. He remonstrated with Danton against the frightful massacres in the prisons on Sept. 2-5; and after that he ceased to appear at the commune. He became a member of the national convention, being elected to represent Paris. On Oct. 29 Louvet denounced him before the convention as aspiring to the dictatorship; but he defended himself triumphantly. He published every Friday a newspaper, entitled *Lettres de Maximilien Robespierre à ses commettants*. He led the Jacobins in the condemnation of the king and in demanding his death. After this event (Jan. 21, 1793) he proposed the decree establishing the committee of public safety, clothed with executive powers above the convention. He was not made a member of it until July 27 following, though on March 26 he was elected a member of what was called the committee of general security, which was only an auxiliary of the committee of public safety. His first great act as a member of this committee was the institution of the reign of terror. The condemnation of the Girondists he defended by saying that "there are periods in revolutions when to live is a crime." The feast of reason, decreed by the convention, disgusted him as the degradation of the revolution. In opposition to Hébert and his adherents, he seems to have sincerely wished the reign of peace and justice, and thereby incurred from them the accusation of moderatism, while he was at the same time preaching terror as the necessary instrument of the revolution. Fanatically bent on ridding the republic of its enemies and wavering friends, and naturally suspicious and envious, he readily caused or allowed the slaughter of innocent victims. He sacrificed Hébert and others of "the impure" to make himself master of the commune, and Danton to make himself master of the convention; while at the Jacobin club his supremacy had long been undisputed. The knife of Charlotte Corday had delivered him of an unworthy rival, Marat. Though he formed a kind of triumvirate with Saint-Just and Couthon, all eyes were now riveted upon him. His commanding influence was signalized by the extraordinary spectacle of June 8, 1794, the festival of the Supreme Being, which he had caused to be decreed, and in which he was the principal actor. But he lacked the courage as well as the genius to organize a dictatorship. On June 10 he proposed through Couthon the law for the reorganization of the revolutionary tribunal, his object being to rid the nation of "the great culprits" in the convention. That body now became alarmed for its own safety. Being unable to control the committees, he withdrew

from them and sought to overthrow them. For the last six weeks of his life he had little voice in the government. In his speech in the convention on July 26 he asked if in that interval "faction had been less audacious, or the country been happier." A tumult followed the speech, and the convention, now led by Tallien and his friends, refused to publish it. This was equivalent to his overthrow. He returned to the Jacobins, and announced himself doomed. They rallied round him, and besought him to head an insurrection against the convention. This he refused to do, and on the following day (the 9th Thermidor) he reappeared in the convention, where his arrest, and that of his brother Augustin, Couthon, Lebas, and Saint-Just, was decreed. The commune instantly organized an insurrection, and rescued him; but the insurrectionists were soon overpowered, and at the hôtel de ville Robespierre was seized. At this time he was wounded in the face by a shot from his own pistol, or, as some assert, from one of the soldiers. The form of trial was quickly enacted, and early in the evening of July 28 the guillotine terminated his existence and that of his most devoted supporters.—See *Histoire de Robespierre*, by Tissot (2 vols., Paris, 1844); "Life of Robespierre," by Lewes (London, 1850); *Histoire de Robespierre*, by Hamel (3 vols., Paris, 1865-'7); and *Leben Robespierre's*, by J. Herzmann (Berlin, 1871 *et seq.*).

ROBIN, a name applied in the old world to several small dentirostral birds of the family of warblers, and subfamily *erythacinæ*. In these the bill is short, slender, tapering, depressed at the base, slightly curved and notched at the tip, and the gape and basal portion of the nasal groove covered with bristles; the tarsi are long and slender, covered in front with an entire scale, occasionally showing marks of division; the toes are moderate, the hind one and claw usually the longest, and the claws curved and sharp; tail usually short and broad, and wings moderate and rounded. Gray mentions 15 genera, most of which are inhabitants of the eastern hemisphere, over which they are very generally distributed; they feed on worms, insects, seeds, and fruits, which they seek on the ground or in trees, and when hard pressed approach familiarly human habitations; the nests are large and carefully lined with soft materials, and the eggs generally pale blue. The only genus that can be mentioned here is *erythacus* (Cuv.), and the single species the robin redbreast (*E. rubecula*, Cuv.). It is about 5½ in. long, with an alar extent of 9 in.; the prevailing color above is olive-green; the forehead, cheeks, fore neck, and part of breast, light yellowish red. It is a permanent resident in temperate Europe, Asia Minor, and North Africa, and is the most familiar of the small birds. The song is sweetly modulated, plaintive, and not loud, heard through spring, summer, and autumn, and even in dull and rainy weather when most other song birds are silent;

it is one of the latest birds to retire at night, and one of the earliest in the morning; it never congregates in flocks; the food consists of worms (which it beats to death and cleanses



Robin Redbreast (*Erythacus rubecula*).

before eating), insects, and their larvæ. Generally, and especially in the breeding season, it is very pugnacious, driving off all small birds coming near its favorite resorts, and attacking even cats and large birds. The nest is often made in outbuildings which are daily used, and sometimes in situations where there is great confusion and noise; it is made of moss, leaves, and grasses, lined with hair and feathers; the eggs are five or six, white, with pale reddish brown spots.—Birds of very different families in various parts of the world bear this name, as is the case with the American robin, which is one of the thrushes, *turdus migratorius* (Linn.); the generic characters are given under THRUSH. This well known bird is nearly twice the size of the European robin; the general color above is olive-gray, with the top and sides of the head black, chin and throat



American Robin (*Turdus migratorius*).

white, black-streaked, breast red, and the under parts chestnut brown; there is considerable variation in the plumage, which is more

or less marked with white, even to albinism. It is distributed over North America, as far as Mexico on the west and to lat. 60° N., breeding over most of this extent. This is one of the first birds seen in the spring, a few in sheltered places remaining all winter as far north as New England, and many arriving there from the south before the snow has disappeared; but most migrate during winter to the southern states, where they are very common, occurring in flocks, and killed in immense numbers. The food of this robin, in spring, consists of insects, worms, and grubs; in summer, of the smaller fruits, like cherries and strawberries, whence its persecution; and in autumn, of wild berries and insects. The song is simple but pleasing and lively, though not to be compared to that of many other thrushes; it much resembles that of the European blackbird (*T. merula*, Linn.). Much of the regard in which the robin is held here is derived from that accorded to the English robin, which ours resembles in its red breast, familiar disposition, and cheerful notes; it is generally protected, except during the shooting season in the southern and middle states, where it is slaughtered indiscriminately; in Massachusetts the laws forbid its destruction at any time of year. The nest is often built near houses and in very noisy locations; a robin has been known to build on the timbers of a railroad bridge over a wide sheet of water, on which trains passed at least every hour. The eggs are four to six, bluish green and unspotted; they are rarely molested; two broods are raised in a season, even in New England; the parents are very anxious in regard to the young, uttering a shrill and plaintive cry when the nest is approached; they sometimes breed year after year on the same spot. The flight is rapid, and at times high and long sustained. It is often kept as a cage bird; it is fed on bread soaked in milk or water, fruits, and insects; it is long-lived in captivity, but liable to suffer and die during moulting. The flesh is tender, savory, and easily digested, and a favorite article of food in the middle and southern states.—The golden robin has been described under BALTIMORE BIRD.

ROBIN, Charles Philippe, a French physiologist, born at Jasseron, department of Ain, June 4, 1821. He studied in Paris, and won in 1844 a prize at the *école pratique de médecine*, where he established a museum of natural history and anatomy, for which he was deputed by Orfila to collect specimens on the coast of Normandy and in the island of Jersey. He took his degree in 1846, and in 1847 became professor of general anatomy, and in 1862 of the new department of histology in the faculty of medicine. He is regarded as the leader, if not the founder, of the school of microscopic physiology, and has greatly promoted anatomical, physiological, and pathological researches. Since 1864 he has edited the *Journal de l'anatomie et de la physiologie*. In 1866 he was elected to the academy of sciences. His works

include *Du microscope et des injections dans leur application à l'anatomie et à la pathologie* (8vo, 1849; 2d ed., 1870); *Tableaux d'anatomie* (4to, 1851); *Traité de chimie anatomique et physiologique, normale ou pathologique*, written by him jointly with Verdeil (3 vols. 4to, with atlas, 1853); *Histoire naturelle des végétaux parasites* (8vo, 1853); *Anatomie microscopique* (1868); and a series of *Leçons* on special subjects (1866-'7). With Littré he recast successive editions of Nysten's *Dictionnaire de médecine*, and the 12th edition (1865) so thoroughly that at the request of Nysten's widow the tribunal of the Seine decided in 1866 to strike out her husband's name as its author.

ROBIN HOOD. See HOOD, ROBIN.

ROBINA. See LOCUST.

ROBINSON. I. Edward, an American Biblical scholar, born at Southington, Conn., April 10, 1794, died in New York, Jan. 27, 1863. He graduated at Hamilton college, Clinton, N. Y., in 1816, and served for a year as tutor there. In 1821 he went to Andover, Mass., to procure the printing of an edition of the first six books of the Iliad, which he had prepared. While there he assisted Prof. Stuart in his Hebrew grammar and translations from the German, and was finally appointed assistant instructor. From 1826 to 1830 he studied and travelled in Europe, and on his return was appointed professor extraordinary of sacred literature at Andover, which chair he resigned in 1833 and removed to Boston. In 1837 he was appointed professor of Biblical literature in the Union theological seminary in New York. Before entering upon this office he visited Palestine, of which, in company with the Rev. Dr. Eli Smith, he made a minute survey, and published "Biblical Researches in Palestine, and in the Adjacent Countries, a Journal of Travels in the Year 1838" (3 vols. 8vo, Halle, London, and Boston, 1841). He entered upon his professorship in 1840, and held it till his death. In 1852 he again visited Palestine, and published the results of this tour in 1856 ("Later Researches," 1 vol. 8vo), with a revision of his previous researches (3d ed. of the complete work, 3 vols., London, 1867). He was a member of the American geographical, oriental, and ethnological societies. He received the degree of D. D. from Dartmouth college in 1831 and from the university of Halle in 1842, and that of LL. D. from Yale college in 1844. In addition to the works above enumerated, he published a translation of Buttmann's Greek grammar (Andover, 1832; new translation from the 18th German ed., New York, 1850); "A Greek and English Lexicon of the New Testament" (Boston, 1836; new ed., entirely rewritten, New York, 1850); "The Harmony of the Four Gospels," in Greek (Boston, 1845), and in English (1846); and a memoir of his father, the Rev. William Robinson (1859). His "Physical Geography of the Holy Land" was published posthumously (8vo, Boston, 1865). He edited from 1831

to 1834 the "Biblical Repository," a theological quarterly, subsequently united with the "Bibliotheca Sacra," which he established and edited for one year in New York. He also edited Calmet's "Biblical Dictionary" and other works, and published several revisions of his translation of Gesenius's Hebrew lexicon.—See his "Life, Character, and Writings," by Henry B. Smith, D. D., and Roswell D. Hitchcock, D. D. (New York, 1864). After his death his library was purchased for Hamilton college. **II. Therese Albertine Louise von Jakob**, wife of the preceding, born in Halle, Germany, Jan. 26, 1797, died in Hamburg, April 13, 1869. In 1807 she accompanied her father (see JAKOB, LUDWIG HEINRICH VON) to Russia, where she studied the Slavic languages and literature, and wrote her first poems. In 1816 she returned with her father to Halle, and in 1822 published, under the signature of Ernst Berthold, translations of Scott's "Old Mortality" and "The Black Dwarf." She wrote a few tales, which were published in 1825 under the title of "Psyche," and others appeared under the signature of "Talvj" (Talvi), formed from the initial letters of her maiden name. She translated a number of poems from the Servian language, which were published under the title of *Volkslieder der Serben* (2 vols., Halle, 1825-'6). In 1828 she was married to Prof. Robinson, and in 1830 accompanied him to America. Here she translated into German Mr. John Pickering's work on the Indian tongues of North America (Leipsic, 1834). In 1834 she wrote for the "Biblical Repository" a "Historical View of the Slavic Languages," which was revised and published as "Historical View of the Languages and Literature of the Slavic Nations, with a Sketch of their Popular Poetry" (1850). During her husband's first visit to Palestine (1837-'40) she was in Germany, and published *Versuch einer geschichtlichen Charakteristik der Volkslieder germanischer Nationen* (Leipsic, 1840), and *Untersuchung über die Authenticität des Ossian* (1840). After her return to New York she wrote a history of Capt. John Smith in German, followed by *Die Colonisation von Neu England* (Leipsic, 1847), of which work the younger Hazlitt made a translation into English (2 vols., London, 1851). Her other works, originally published in Germany and translated into English by her daughter, include "Heloise, or the Unrevealed Secret" (New York, 1850), "Life's Discipline, a Tale of the Annals of Hungary" (1851), and "The Exiles" (1853), republished in 1856 as "Woodhill, or the Ways of Providence." After the death of her husband she resided in Hamburg, where her son was American consul, and there continued her literary activity. Her last work, "Fifteen Years, a Picture from the Last Century," has been published in this country since her death.

ROBINSON, Ezekiel Gilman, an American clergyman, born at Attleborough, Mass., March 23,

1815. He graduated at Brown university in 1838, at Newton theological institution in 1842, and was ordained and settled as pastor of a Baptist church in Norfolk, Va., in November, 1842. In 1846 he accepted the professorship of Hebrew in the theological seminary at Covington, Ky., but lost it in 1848 when during the anti-slavery troubles the legislature changed the charter. In 1853 he became a professor in the Rochester theological seminary, of which he was subsequently made president. In 1872 he became president of Brown university, which office he still holds (1875). He edited the "Christian Review," quarterly, from 1859 till 1864, when it was merged in the "Bibliotheca Sacra." He has published a translation of Neander's "Planting and Training of the Christian Church" (8vo, New York, 1865), and "The Relation of the Church and the Bible" (1866). He is noted as a powerful and popular preacher and an effective political orator.

ROBINSON, John, an English clergyman, born in 1575, died in Leyden, March 1, 1625. He was educated at Cambridge, and held for a time a benefice near Yarmouth in Norfolk, but in 1602 became pastor of a dissenting congregation at Norwich. In 1607 its members, on account of persecution, attempted to leave England for Holland, but were prevented by the civil officers, who kept the whole company under arrest for a month. In 1608, however, they went to Amsterdam, and in 1609 removed to Leyden. Here they remained 11 years, and their numbers were largely increased by arrivals from England. In 1613 Robinson had a controversy on free will with Episcopius, professor in the university of Leyden. In 1617 another removal was contemplated, and the pastor favored the plan of forming a settlement in America. A minority of the congregation, under the lead of Brewster, the ruling elder, set out in 1620 in two ships, the *Speedwell* and the *Mayflower*. It was the intention of Robinson to follow with the rest of the congregation, but he died before the consent of the association of English merchants who controlled the enterprise could be obtained. The remainder of his church emigrated not long after his death, and his sons John and Isaac followed in 1629 or 1630. He was an acute controversialist, and highly versed in classical learning. He published "A Justification of Separation from the Church of England" (1610); "Of Religious Communion" (1614); *Apologia Justa et Necessaria* (1619), which in 1644 was translated into English; "A Defence of the Doctrine propounded by the Synod of Dort" (1624); "Essays or Observations, Divine and Moral" (1628); and "A Treatise of the Lawfulness of Learning of the Ministers in the Church of England" (1634). His complete works, with a memoir by Robert Ashton (3 vols.), were published in London and at Boston in 1851.

ROBINSON, John, a Scottish writer on natural philosophy, born at Boghall, Stirlingshire, in

1739, died in Edinburgh, Jan. 30, 1805. He graduated in 1756 at the university of Glasgow, and in 1758 went to London, became private tutor to the son of Admiral Knowles, and entered as midshipman on board the Royal William, his pupil being lieutenant, under whom he served two and a half years. He was then sent to Jamaica to test Harrison's chronometer. In April, 1763, he resumed his studies at the university of Glasgow, and in 1766 succeeded Dr. Black as lecturer in chemistry. In 1770 he went to St. Petersburg as secretary to Admiral Knowles, who had been invited thither to suggest reforms in the Russian navy, and in 1772 he was made inspector general of the corps of marine cadets at Cronstadt. From 1774 till his death he was professor of natural philosophy in the university of Edinburgh. His works, including his contributions to the "Encyclopædia Britannica," were published under the title "A System of Mechanical Philosophy," with notes by David Brewster (4 vols. 8vo, London, 1822); besides which he was the author of numerous scientific papers, and of "Proofs of a Conspiracy against all the Religions and Governments of Europe" (8vo, Edinburgh, 1797).

ROB ROY (literally, Robert the Red), a Scottish outlaw, born about 1660, died about 1738. His true name was Robert Macgregor, which, after the outlawry of the clan Macgregor by the Scottish parliament in 1693, he changed for that of his mother, Campbell. Previous to the rebellion of 1715 he was a dealer in cattle; but having joined the pretender, he gave his enemy, the duke of Montrose, an excuse for seizing his lands. He retaliated by a war of reprisals upon the duke. For many years he continued to levy blackmail upon his enemies in spite of the presence of a British garrison near his residence at Aberfoyle. His name and exploits have survived chiefly through Scott's novel, "Rob Roy."

ROCHAMBEAU. I. Jean Baptiste Donatien de Vimeur, count de, a French soldier, born in Vendôme, July 1, 1725, died at Thoré, near that city, May 10, 1807. He entered the army in 1742, and distinguished himself in various campaigns, reaching the rank of lieutenant general. In 1780 he was placed in command of the French army sent to America, and in 1781 he actively cooperated with Washington in the movements which led to the capitulation of Cornwallis at Yorktown. Congress presented him with two pieces of cannon captured from the English, and on his return to France in 1783 he was made governor of Picardy and Artois, and in 1791 marshal. In 1792 he commanded the army of the north, but soon resigned. During the reign of terror he was imprisoned, and only escaped the guillotine by the death of Robespierre. Bonaparte named him grand officer of the newly created legion of honor and pensioned him. He left *Mémoires*, which were edited by Luce de Lancival (2 vols., 1809; translated into Eng-

lish by M. W. E. Wright (1838). **II. Donatien Marie Joseph de Vimeur**, viscount de, a French soldier, son of the preceding, born in 1750, killed at Leipsic, Oct. 18, 1813. He early entered the army, became general in 1792, and fought the negroes in Santo Domingo. In the following year he defeated the allied English and French royalists in Martinique; but the former being reinforced, he was obliged to surrender, March 22, 1794, after holding out for nearly two months at St. Pierre. In 1796 he became governor general of Santo Domingo, but a conflict with the civil authorities resulted in his being carried as a prisoner to France. In 1800 he was placed at the head of a division in Italy. At the close of 1801 he went with Leclerc to Santo Domingo, co-operated in the defeat of Toussaint l'Ouverture, and on Leclerc's death (Nov. 2, 1802) succeeded him as governor. He imposed onerous taxes upon the rich to enable him to put down the insurgents, but was overpowered and obliged to return to France in 1803. Contrary to a convention with the British squadron, he was taken prisoner on the French coast and detained in England till 1811. He distinguished himself in the campaign of 1813.

ROCHDALE, a town of Lancashire, England, on both sides of the river Roch, 10 m. N. N. E. of Manchester; pop. in 1871, 44,559. A parliamentary act in 1872 extended the municipal borough over the district comprised within the limits of the parliamentary borough, making the population of the present limits 63,485. Within a few years the town has been much improved, the new parts presenting wide, well paved streets, lighted with gas, and lined with buildings of brick and stone. There are more than 20 places of worship and numerous schools, and a fine town hall was built in 1865. The parish church dates from the 12th century. The Roch is here crossed by five bridges. Woollen manufacture was introduced by Flemish immigrants in the time of Edward III., and the town is now noted for its extensive manufactories of flannel, baize, blankets, and kerseys. There are also cotton warp and yarn mills, calico printing works, hat manufactories, machine shops, and brass and iron foundries. Coal and iron are mined, and slate, flag, and free stones are quarried in the vicinity. Rochdale is the seat of the most successful of the English coöperative associations, called the equitable pioneers' society; it was founded in 1844 by a few flannel weavers, with a capital of £28 to start a small store for supplying the members with the necessities of life at cost; at the close of 1870 it had 5,560 members, a share capital of £81,232, several shops and factories, a library of 7,000 volumes, and a sick and burial society, and had largely invested in cottages for members.

ROCHEFORT, or **Rochefort-sur-Mer**, a fortified town of France, in the department of Charente-Inférieure, on the right bank of the Charente, about 9 m. from its mouth, and 18 m.

S. S. E. of La Rochelle; pop. in 1872, 28,299. It was a place of no importance till 1666, when it was made a naval station by Louis XIV., the harbor was enlarged, and the city was fortified by Vauban. It has extensive docks, magazines, cannon foundries, and a marine hospital; and it ranks among the first naval establishments of France. It is also a commercial centre of importance. Napoleon here surrendered to Capt. Maitland, of the British man-of-war *Bellerophon*, July 15, 1815.

ROCHEFORT-LUÇAY, **Victor Henri**, count de, popularly known as **HENRI ROCHEFORT**, a French journalist, born in Paris, Jan. 30, 1830. In early life he was one of the writers of the *Charivari*. He held for some time an office in the department of fine arts, but after 1861 devoted himself wholly to journalism. After contributing to various papers, he was engaged to write for the *Figaro* at an annual salary of 30,000 francs, but in 1868 retired to save that journal from prosecution, and established the *Lanterne*, which was soon stopped by the government on account of its violent attacks upon the imperial family. He fled to escape imprisonment, and continued to publish the *Lanterne* at Brussels till August, 1869, when on his election to the legislative body he was permitted to return to Paris. In the same year he founded the *Marseillaise* newspaper, in which Victor Noir was a collaborator. After the assassination of the latter by Prince Pierre Bonaparte, Jan. 10, 1870, the paper was seized, and Rochefort was arrested. On the proclamation of the republic (Sept. 4) he was taken from prison by the populace. For a short time he was connected with the government of national defence. During the siege of Paris he was president of the commission of barricades, and he established the *Mot d'Ordre*. On Feb. 8, 1871, he was elected as one of the representatives of Paris in the national assembly. At the establishment of the commune (March 18) he was in Paris, and he immediately took its side in the *Mot d'Ordre*, vehemently assailing the government of Versailles and M. Thiers personally. After an ineffectual attempt to escape shortly before its fall, he was sentenced to imprisonment for life. In September, 1872, he was temporarily released to enable him to legitimate his children by marrying their mother, who was dying, and was then transported to New Caledonia. He escaped in March, 1874, and lectured in New York for the benefit of his fellow exiles. In Ireland he was rescued by the police from the mob, who regarded him as one of the murderers of the archbishop of Paris. He attempted to revive the *Lanterne* in London, and then in Geneva, but with no success. In conjunction with others he has written plays, and he is the author of many pamphlets and of several books, chiefly collections of his newspaper articles. In 1875 he published at Geneva *Les dépravés* and a satire on MacMahon.

ROCHEFOUCAULD. See LA ROCHEFOUCAULD.

ROCHEJAQUELEIN. See LA ROCHEJAQUELEIN.

ROCHELLE, La, a fortified town of France, capital of the department of Charente-Inférieure, situated on the bay of Biscay, opposite the island of Ré, 245 m. S. W. of Paris; pop. in 1872, 19,506. Among the principal buildings are the cathedral, hôtel de ville, and exchange. The *place d'armes* is considered one of the finest squares in France. Ship building is carried on, and pottery, glass, and cotton goods are manufactured. La Rochelle fell into the hands of the Huguenots in 1557, and was gallantly defended in 1573, when a favorable peace was extorted from the Catholics; it continued an important centre of the Protestants till 1628, when, feebly supported by England, they surrendered it after a most obstinate siege of 14 months. The mole is still visible that was constructed by Richelieu to close the harbor on this occasion. Vauban afterward built extensive fortifications.

ROCHELLE SALT, or Salt of Seignette (tartrate of potash and soda, sodic-potassic tartrate), a double tartrate of potassium and sodium, discovered by Seignette, an apothecary of La Rochelle. By neutralizing cream of tartar (bitartrate of potash, $\text{KH}_2\text{C}_4\text{H}_4\text{O}_6$) with carbonate of soda, its basylous atom of hydrogen may be replaced by sodium. By evaporation the tartrate of potash and soda separates in large transparent rhombic prisms of the formula $\text{KNaC}_4\text{H}_4\text{O}_6 + 4\text{Aq}$. The crystals melt in this water of crystallization between 160° and 176° F., and dissolve in 2 parts of water at 42° , and in 0.3 part at 100° . Acids precipitate cream of tartar from the solution. The salt is a mild cooling purgative, in doses of from two drachms to an ounce. In small and repeated doses it does not purge, but is absorbed and renders the urine alkaline. It is the principal component of Seidlitz or Rochelle powders.

ROCHESTER, a city, port of entry, and the capital of Monroe co., New York, on the Genesee river, 7 m. from its mouth in Lake Ontario and 229 m. by railroad W. N. W. of Albany; pop. in 1815, 331; in 1820, 1,502; in 1830, 9,207; in 1840, 20,191; in 1850, 36,403; in 1860, 48,204; in 1870, 62,386; in 1875, 81,673. Of the gain in population during the last five years, 8,136 were brought in with annexed territory. The extreme length and breadth

are each $4\frac{1}{2}$ m.; area, $17\frac{1}{2}$ sq. m. The city is divided into about equal portions by the Genesee river, which has a rapid descent soon after it enters the city, a perpendicular fall of 96 ft. near the centre, and two others of 25 ft. and 84 ft. near the northern limit. The site of the city is nearly level, and below the great fall the river flows through a deep narrow gorge. The streets are nearly all laid out at right angles, and are from 66 to 100 ft. wide; many of them are well paved with stone, and most of them are bordered with shade trees. The city has a thorough system of sewerage, and is lighted with gas. There are six public squares, of from four to eight acres each. Nearly all the dwellings are built separate from each other and surrounded by a little cultivated or ornamented ground. The New York Central railroad passes through the city, with two branches to the east (Syracuse and Auburn) and two to the west (Buffalo and Niagara



View in West Main Street, Rochester.

Falls), and has also a branch to Charlotte, at the mouth of the river. The Genesee Valley railroad (a branch of the Erie) enters the city from the south, and the Rochester and State Line railway, now (1875) completed from Rochester to Le Roy, will ultimately connect the city direct with the bituminous coal region of Pennsylvania. The Erie canal also passes through from east to west, crossing the river on a fine aqueduct of ten arches, 848 ft. long, with a channel 45 ft. wide, which cost \$600,000. The Genesee Valley canal here unites with the Erie. The river is crossed by five highway and two railroad bridges. Mount Hope cemetery, on a group of rounded hills in the southern part of the city, contains 188 acres, and is one of the most beautiful in the country. The new city hall is of gray limestone, with interior walls of brick, fire-proof throughout; it is 138 ft. long, 80 ft. wide, and four stories high, with a tower 175 ft. high,

and cost \$335,000. The court house is of brick, with limestone trimmings, three stories high. The new free academy is 136 ft. long, 80 ft. wide, and four stories high, built of brick, with sandstone trimmings, and cost \$125,000. Water for extinguishing fires is pumped from the river by machinery on the Holly system. Works designed to bring pure water from Hemlock lake, 28 m. S. by E. of the city, will probably be completed about the close of 1875. The cost for both systems has been \$3,200,000. A street railroad runs through the principal avenues. There are 59 religious societies, all but two of which have edifices of their own, viz.: 5 Baptist, 1 Christadelphian, 1 Congregational, 7 Episcopal, 5 German Evangelical, 2 Friends', 2 Jewish, 2 Lutheran, 9 Methodist, 10 Presbyterian, 1 Reformed church in America, 11 Roman Catholic, 1 Second Advent, 1 Unitarian, and 1 Universalist. The finest church edifice is St. Patrick's cathedral (built in 1864-'9), which is in Gothic style, of red sandstone trimmed with gray limestone, 170 ft. long, 112 ft. wide in the transept, and 76 ft. high; it cost \$150,000. The city hospital, sustained by the contributions of Protestants, has property to the value of \$105,000, including a fine building; it can accommodate 120 patients, and has an average of 60. St. Mary's hospital (Roman Catholic) has property valued at \$200,000, including a large building of gray sandstone; it accommodates 300 patients, and has an average of 200. Other charitable institutions are: a Catholic orphan asylum, with property valued at \$30,000; Protestant orphan asylum, \$157,000; industrial school, \$34,000; home for the friendless, \$50,000; church home (Episcopal), \$40,000; and house for idle and truant children, \$40,000. The county jail, the county penitentiary, a state arsenal, and the western house of refuge are all within the city limits. The last named, opened in 1849, has real estate to the value of \$500,000, including a farm of 42 acres. It was opened in 1850, and on Dec. 31, 1874, had 386 inmates, all boys; at that date it had received in all 4,083 boys, and had cost the state \$986,492. A department for girls has recently been authorized, and will be constructed at once. There are 20 public schools (including the free academy), employing 183 teachers and having in 1875 11,275 pupils, and two public libraries, containing 20,000 and 7,000 volumes respectively. The university of Rochester was established in 1850 by the Baptists, and in 1875 had nine professors, 160 students, and about 600 graduates. It discarded the dormitory system from the beginning, and claims no control over the students out of recitation hours. Several denominations are represented in the faculty and board of trustees. It has both a classical and a scientific course. It is situated in the eastern part of the city, where it has 23½ acres of ground, beautifully laid out, and occupies a massive building of dark red sandstone (com-

pleted in 1861), which is 150 ft. long, 80 ft. in extreme width, and three stories high. The library contains 11,500 volumes; and the geological cabinets, collected by Prof. Henry A. Ward, are said to be the finest in the country. For the library and cabinets a fire-proof building, 140 by 80 ft. and two stories high, is now (1875) nearly completed; its cost will be about \$100,000, and on its completion the library is to be free to the public for consultation. The university holds property to the amount of \$377,000, and has productive funds aggregating about \$200,000. The Rochester theological seminary, founded in 1850 by the Baptists, in 1875 had 7 professors, 80 students, and upward of 300 graduates. Its library numbers more than 10,000 volumes, including 4,000 which constituted the library of Neander, the German church historian. The seminary occupies a fine building, erected in 1869 at a cost of \$42,000, which is four stories high and is of brick trimmed with limestone. Another building has recently been added for lecture rooms and a gymnasium. It has property worth \$100,000, and productive funds to the amount of \$260,000.—The city is divided into 16 wards, and is governed by a mayor and a common council consisting of two aldermen from each ward. The board of education consists of one commissioner from each ward, chosen by the people for three years. There are a paid fire department, a fire telegraph, and a police force of 80 men. The assessed valuation of property in 1875 was \$61,351,700 (\$905,000 of this being personal), which is about three fourths of the true value. The rate of general city tax on assessed valuation is 1.33 per cent. The city debt in March, 1875, was nearly \$5,000,000, and the city owns property, exclusive of water works, valued at \$2,000,000. The exports at the port of Genesee during the year ending June 30, 1875, were valued at \$784,979; the imports at \$331,609; entrances, 714; clearances, 705. The manufactures of Rochester are extensive and varied, including nearly all that are mentioned in the article on Monroe county. The largest industries are those of clothing, boots and shoes, beer, flour, agricultural implements, furniture, cooperage, steam engines and boilers, locomotive building and repairing, edge tools, garden and flower seeds, and trees. The regular publications include 4 daily newspapers (1 German), 1 tri-weekly, 2 semi-weekly, 7 weekly (2 German), and 3 monthly periodicals. There are five banks of discount and circulation, with an aggregate capital of \$850,000, four savings banks, and a trust company.—The first permanent settlement on the site of Rochester was made in 1810. In 1812 a village was laid out by Nathaniel Rochester and two associates from Maryland. It was incorporated as a village in 1817, and as a city in 1834. It owes its rapid growth to the immense water power furnished by the river, the facilities for transportation, and the remarkable fertility of the

surrounding country, which is now largely occupied by nurseries, some of them being among the most extensive in the world. In March, 1865, owing to encroachments upon the bed of the river, a sudden freshet overflowed the banks, and for three days almost the entire business portion of the city was from three to six feet under water. Several large buildings were undermined and destroyed; the total damage was estimated at \$250,000.

ROCHESTER, a city of Kent, England, on the right bank of the Medway, near Chatham, 12 m. from the Nore, and 28 m. S. E. of London; pop. in 1871, 18,352. On an abrupt eminence are the ruins of Rochester castle, and along the shores of the river are works connecting with the Chatham fortifications. The city has no manufactures of consequence, but considerable trade, and it is a port of entry. Many of the inhabitants find employment in the adjoining naval establishments, and there is some ship building. Among the public institutions are a cathedral grammar school, founded by Henry VIII. in 1542, and the "Poor Traveller's House," founded by Richard Watts in the reign of Elizabeth. The cathedral, originally a priory founded about 604, rebuilt about 1076, and recently restored, is principally Norman and early English in style. St. Nicholas church dates from 1420, and was partially rebuilt in 1624. Among the interesting ruins is Bishop Gundulph's keep.

ROCHESTER, John Wilmot, second earl of, a wit of the court of Charles II., born at Ditchley, Oxfordshire, in 1647 or 1648, died July 26, 1680. He travelled in France and Italy, and in 1665-'6 served at sea, distinguishing himself on several occasions; but on returning to London he would not fight duels and lost reputation. The king made him a gentleman of the bedchamber and ranger of Woodstock park. He became addicted to intemperance, and was famous for debauchery and buffoonery. When prostrated by disease, he was converted from infidelity, and on his deathbed directed the destruction of all his profane and licentious writings. But shortly after his death appeared a volume of his "Poems on several Occasions" (reprinted in 1685, '91, and '96), followed by his "Familiar Letters" (1697). In the edition of 1731-'2, which includes poems by Roscommon, Dorset, and others, much that is attributed to Rochester is probably spurious. Dr. Burnet published "Some Passages of the Life and Death of John, Earl of Rochester" (1681), and Dr. Johnson wrote his biography in "Lives of the Poets." His only son died a minor in 1681, when the title became extinct.

ROCHESTER, Nathaniel, an American pioneer, born in Westmoreland co., Va., Feb. 21, 1752, died in Rochester, N. Y., May 17, 1831. In early life he became a merchant at Hillsboro, N. C., and was a major of militia. In 1775, at the head of his command, he captured the British Gen. McDonald and the thousand Scotch recruits whom he was endeavoring to

embark at Wilmington. In 1776 Rochester was a member of the convention which framed the constitution of North Carolina, and was appointed commissary general. After the war he became a merchant and manufacturer at Hagerstown, Md. About 1800 he made large purchases of land in the Genesee valley; and in 1818 he removed to Rochester, which in 1812 had been named after him.

ROCHET, Louis, a French sculptor, born in Paris, Aug. 24, 1813. He studied under David d'Angers, and exhibited his first work in 1835. Among his principal works are: "Madame de Sévigné," at Grignan (1857); a colossal statue of Pedro I. of Brazil, unveiled at Rio de Janeiro in 1862; an equestrian statue of Charlemagne (1867); and "Raphael" (1868).

ROCHETTE, Désiré Raoul (called RAOUL-ROCHETTE), a French archæologist, born at St. Amand, near Bourges, about 1790, died in Paris, July 5, 1854. He was educated at the college of Bourges, went to Paris at the age of 21, and became substitute for Guizot in the professorship of modern history at the faculty of letters in 1815, member of the academy of inscriptions and editor of the *Journal des Savants* in 1816, keeper of the cabinet of medals in the royal library in 1818, royal censor of newspapers in 1820, assistant of Quatremère de Quincy in the chair of archæology in 1824, and his successor in 1826, a member of the scientific commission to the Morea in 1828, and perpetual secretary of the academy of fine arts in 1839. A volume of his lessons was translated into English by H. M. Westropp ("Lectures on Ancient Art," London, 1854). Among his numerous other works are: *Histoire critique de l'établissement des colonies grecques* (4 vols. 8vo, 1815); *Lettres sur la Suisse* (3 vols. 8vo, 1820-'22, and fol., with plates, 1823-'7); *Monuments inédits d'antiquité figurée grecque, étrusque et romaine* (fol., 1828); *Peintures antiques inédites* (4to, 1836); and *Sur les antiquités chrétiennes des catacombes* (4to, 1839).

ROCK. L. A S. county of Wisconsin, bordering on Illinois, intersected N. and S. nearly in the middle by Rock river, and drained by its branches; area, about 750 sq. m.; pop. in 1870, 39,030. Its surface is nearly level, with much prairie, especially E. of Rock river, which is nearly all occupied by Rock prairie; and the soil is very fertile. It is intersected by the Wisconsin division of the Chicago and Northwestern railroad, the Western Union, and the Prairie du Chien division of the Milwaukee and St. Paul railroad. The chief productions in 1870 were 865,048 bushels of wheat, 120,965 of rye, 1,137,304 of Indian corn, 1,173,714 of oats, 204,998 of barley, 26,864 of buckwheat, 442,151 of potatoes, 52,122 tons of hay, 645,508 lbs. of tobacco, 264,446 of wool, 1,043,169 of butter, 36,110 of cheese, 12,785 of hops, and 20,653 of honey. There were 13,995 horses, 12,852 milch cows, 14,861 other cattle, 62,193 sheep, and 23,438

swine; 8 manufactories of agricultural implements, 23 of carriages and wagons, 6 of cheese, 5 of furniture, 4 of iron castings, 3 of machinery, 8 of brick and stone, 3 of sash, doors, and blinds, 3 of woollen goods, 8 flour mills, and 4 distilleries. Capital, Janesville. **II.** The S. W. county of Minnesota, bordering S. on Iowa and W. on Dakota; area, 432 sq. m.; pop. in 1870, 138. It has a rolling surface, and is drained by tributaries of the Big Sioux and Rock rivers.

ROCKBRIDGE, a central county of Virginia, intersected by North river, a branch of the James, and bordered S. E. by the Blue Ridge; area, about 700 sq. m.; pop. in 1870, 16,058, of whom 3,890 were colored. It has a mountainous surface and very fertile soil. The Chesapeake and Ohio railroad crosses the N. W. corner. The county derives its name from the natural bridge in the S. corner. (See **BRIDGE, NATURAL**.) The chief productions in 1870 were 214,800 bushels of wheat, 119,518 of Indian corn, 85,564 of oats, 6,022 tons of hay, 186,469 lbs. of tobacco, 9,156 of wool, 131,092 of butter, and 3,290 gallons of sorghum molasses. There were 2,288 horses, 2,378 milch cows, 4,493 other cattle, 3,481 sheep, and 6,986 swine; 1 manufactory of cement, 2 of tin, copper, and sheet-iron ware, 4 of tanned and 4 of curried leather, and 16 flour mills. Capital, Lexington.

ROCK CASTLE, a S. E. county of Kentucky, bordered S. E. by Rock Castle river, by the branches of which and Dick's river it is drained; area, about 350 sq. m.; pop. in 1870, 7,145, of whom 369 were colored. It has an uneven surface and a not very fertile soil. It is intersected by the Louisville and Nashville and Great Southern railroad. The chief productions in 1870 were 10,539 bushels of wheat, 216,816 of Indian corn, 35,077 of oats, 23,445 lbs. of tobacco, 10,949 of wool, 92,675 of butter, and 11,702 gallons of sorghum molasses. There were 1,638 horses, 1,648 milch cows, 2,314 other cattle, 6,625 sheep, and 7,189 swine. Capital, Mount Vernon.

ROCKDALE, a N. county of Georgia, bounded S. W. by South river, a branch of the Ocmulgee, and drained by other branches of that stream; area, 200 sq. m. It has been formed since the census of 1870. The Georgia railroad traverses it. The surface is diversified, and the soil good. Iron, gold, and other minerals are found. Capital, Conyers.

ROCKET, a projectile which is set in motion by a force residing within itself, thus performing the twofold functions of piece and projectile. Rockets are used as night signals, missiles of war, and in pyrotechnic displays. They are said to have been invented about the close of the 9th century, and to have been used for war purposes in India and China even before the invention of gunpowder. Their inferior force and accuracy limited their use by Europeans to incendiary and signal purposes till 1804, when Sir William Congreve turned his

attention to their improvement. He substituted sheet iron for paper cases, made the guide stick shorter, and attached it to the centre instead of the side of the base. He prepared and used them successfully at the siege of Boulogne and the battle of Leipsic, and is said to have increased the range of the six-pounder rocket from 600 to 2,000 yards. Rockets are now constructed of cylindrical cases composed of paper or wrought iron, according to the use for which they are intended, and are filled with a composition of nitre, charcoal, and sulphur, like gunpowder, except that the ingredients are compounded for a slower rate of combustion. If penetration and range are required, as in the case of war rockets, the head is surmounted by a solid shot; if explosion or incendiary effect, by a shell or a case shot with a fuse attached, which is ignited by the flame of the composition. The base is perforated by one or more vents for the escape of the gas generated within, and sometimes with a screw hole into which a guide stick is fastened. A rocket is set in motion by the reaction of a rapid stream of gas escaping through the vents and impinging against particles of the air, although the reaction of the escaping gas would cause it to move also *in vacuo*. The velocity of the flight depends upon the size and shape of the vents and the velocity with which the gas escapes, and it has been found in practice that the best results are obtained by conical vents. As the composition burns in parallel layers of uniform thickness, the amount of gas generated in a given time or the velocity of its escape from the case depends on the extent of the inflamed surface; and experience shows that to obtain the required surface of inflammation it is necessary to form a long cavity in the mass of the composition. This cavity is called the bore, and in small rockets it is obtained by driving the composition around a spindle, which is afterward withdrawn, while in large rockets the composition is driven in solid, and afterward bored out; the bore is made concentric with the case, and slightly conical. The propelling force of a rocket changes its direction with the axis along which it acts, so that without means of giving stability to this axis the trajectory will be very irregular. Instances have been known where these projectiles have returned to the point whence they started; the "serpent," a species of small rocket, owes its peculiarity to this fact. The two means used to give steadiness to the flight of rockets are rotation, as in the case of a rifle ball, and the resistance of the air, as with an arrow. The first is exemplified in Hale's rockets, where rotation is produced by the escape of the gas through vents situated obliquely with reference to the axis. The common signal rocket is guided by a long stick projecting from its base in the continuation of its axis, or by four shorter ones attached to the side of the case at its base, and each making a small angle with the axis.

Congreve's war rocket is guided by a long wooden stick attached to its base. Rockets are generally fired from wooden tubes or gutters, but where they have four sticks, these, forming a pyramid, permit them to be fired from the ground, by standing them on end. The advantages claimed for war rockets over cannon are unlimited size of projectile, portability, freedom from recoil, rapidity of discharge, and the terror which the noise and fiery trail produce upon troops, especially cavalry or mounted infantry. The numerous conditions to be fulfilled in the construction in order to obtain accuracy of flight, and the difficulty of preserving the composition uninjured, have restricted their usefulness for military purposes. They were not used at all during the civil war in America, though two sizes are prescribed for service, namely, the 2-inch (interior space) weighing 6 lbs., and the 3-inch, weighing 16 lbs., and having with an elevation of from 4° to 5° a range of 500 or 600 yards, and with an elevation of 47° ranges of 1,760 and 2,200 yards respectively. They have also fallen into disuse in Europe, and hereafter, except in peculiar cases, they will probably be confined to the uses of signalling and pyrotechny.—See Benton's "Ordnance and Gunnery" (3d ed., New York, 1867).

ROCK FISH. See Bass, vol. ii., p. 368.

ROCKFORD, a city and the county seat of Winnebago co., Illinois, on both sides of Rock river, here crossed by a fine iron bridge, and at the intersection of the Chicago and Northwestern railroad, the Kenosha division of that line, and the Chicago, Rockford, and Northern railroad, 80 m. in direct line N. W. of Chicago; pop. in 1860, 6,976; in 1870, 11,049, of whom 3,041 were foreigners; in 1875, estimated by local authorities at 15,000. It is surrounded by a rich agricultural region, and has a healthy situation. The streets and private grounds are well shaded, and there are many fine residences. The city is one of the handsomest in the state. It is lighted with gas, and is supplied with water by works on the Holly plan, recently completed at a cost of about \$225,000. The river supplies abundant water power, which is extensively used in manufacturing. There are two paper mills, four extensive flour mills, two cotton factories (producing batting, seamless bags, and yarn), five reaper and mower factories, two machine and mill-casting shops, two pump factories, five extensive plough shops, four sock-knitting establishments, a tuck factory (the only one W. of Pittsburgh), two furniture factories, extensive malleable iron works, a woollen mill (producing cloth and yarn), and various manufactories of agricultural implements. An extensive watch factory has been recently established, with a capital of \$150,000. There are four national banks, a state bank, and a private bank, with private deposits on May 1, 1875, to the amount of \$1,350,000. The city has two high and seven ward schools; a female seminary, founded in

1849, and attended by about 200 pupils; several private schools; and a public library containing 6,500 volumes. Five weekly newspapers and a monthly periodical are published. There are 16 churches, viz.: 2 Baptist, 2 Congregational, 1 Disciples', 1 Episcopal, 1 Liberal Christian (church of the Christian Union), 4 Methodist Episcopal, 2 Presbyterian, 1 Roman Catholic, 1 Swedish Lutheran, and 1 Swedish Methodist.—Rockford was settled in 1836, and incorporated as a city in 1852.

ROCKINGHAM. I. A S. E. county of New Hampshire, bordered E. by the Atlantic and S. by Massachusetts, and separated from Maine on the northeast by the Piscataqua river; area, about 700 sq. m.; pop. in 1870, 47,297. It is watered by the Lamprey, Exeter, Beaver, and Spigot rivers. Great bay, a body of water communicating with the Piscataqua, is on the N. E., and Massabesic lake on the W. border. Its surface is uneven, and the soil fertile. It is intersected by the Manchester and Lawrence, the Concord and Portsmouth, the Boston and Maine, the Eastern, and the Nashua and Rochester railroads. The chief productions in 1870 were 8,065 bushels of wheat, 165,843 of Indian corn, 51,316 of oats, 21,003 of barley, 456,227 of potatoes, 65,604 tons of hay, 28,240 lbs. of wool, 674,208 of butter, and 74,226 of cheese. There were 4,771 horses, 20,129 milch cows, 4,326 working oxen, 7,336 other cattle, 7,960 sheep, and 4,337 swine; 4 manufactories of boats, 34 of boots and shoes, 12 of brick, 12 of carriages and wagons, 12 of men's clothing, 4 of cotton goods, 5 of hosiery, 3 of engines and boilers, 5 of tin, copper, and sheet-iron ware, 5 of woollen goods, 2 flour mills, 70 saw mills, 9 tanneries, and 2 distilleries. Capitals, Portsmouth and Exeter. II. A N. county of Virginia, bordered S. E. by the Blue Ridge and N. W. by the Shenandoah mountains, and drained by the Shenandoah river and its branches; area, about 850 sq. m.; pop. in 1870, 23,668, of whom 2,516 were colored. It occupies part of the great valley of Virginia, and has an uneven surface and fertile soil. The chief productions in 1870 were 375,688 bushels of wheat, 36,251 of rye, 251,754 of Indian corn, 140,896 of oats, 16,459 tons of hay, 27,571 lbs. of wool, 307,688 of butter, and 16,540 gallons of sorghum molasses. There were 6,505 horses, 5,401 milch cows, 9,335 other cattle, 8,061 sheep, and 17,949 swine; 14 flour mills, 1 distillery, and 2 woollen mills. Capital, Harrisonburg. III. A N. county of North Carolina, bordering on Virginia, intersected by the Dan and drained by the head waters of the Haw river; area, about 600 sq. m.; pop. in 1870, 15,708, of whom 6,215 were colored. It has an elevated and hilly surface and a fertile soil. The Richmond and Danville railroad passes through it. The chief productions in 1870 were 53,295 bushels of wheat, 218,469 of Indian corn, 103,528 of oats, 16,159 of Irish and 16,057 of sweet potatoes, 1,441,971 lbs. of tobacco, 7,101 of wool, 92,523 of but-

ter, and 29,457 of honey. There were 1,237 horses, 817 mules and asses, 2,722 milch cows, 3,082 other cattle, 4,759 sheep, and 12,474 swine; and 12 manufactories of chewing tobacco. Capital, Wentworth.

ROCKINGHAM, Charles Watson Wentworth, marquis of, an English statesman, born May 13, 1730, died July 1, 1782. Distinguished by wealth and character, he succeeded in 1765 George Grenville as first lord of the treasury and premier, and henceforth was the leader of the liberal branch of the aristocracy. Although his ministry contained members who had voted against the passage of the stamp act, it did not undertake to repeal it, but made preparations to execute it in all the colonies; but this proving impracticable, the repeal took place in March, 1766, accompanied by an act declaring the supreme power of parliament over America in all respects. Rockingham retired from the premiership on July 12, but resumed it in March, 1782, on the resignation of Lord North.

ROCK ISLAND, a N. W. county of Illinois, separated from Iowa on the N. W. by the Mississippi river, and intersected by Rock river; area, about 350 sq. m.; pop. in 1870, 29,783. The surface is rolling and the soil very fertile. Coal and limestone occur in large quantities. Several railroads centre at the city of Rock Island. The chief productions in 1870 were 245,820 bushels of wheat, 1,459,653 of Indian corn, 276,575 of oats, 36,980 of barley, 192,531 of potatoes, 17,239 lbs. of wool, 563,122 of butter, and 31,299 tons of hay. There were 7,985 horses, 7,471 milch cows, 12,877 other cattle, 5,667 sheep, and 26,625 swine; 7 manufactories of agricultural implements, 10 of brick, 15 of carriages and wagons, 16 of clothing, 12 of cooperage, 3 of iron castings, 7 of lime, 1 of paper, 18 of saddlery and harness, 2 of sash, doors, and blinds, 2 of woollens, 2 tanning and currying establishments, 2 distilleries, 4 breweries, 10 flour mills, and 10 saw mills. Capital, Rock Island.

ROCK ISLAND, a city and the capital of Rock Island co., Illinois, on the Mississippi river, at the foot of the upper rapids, opposite Davenport, Iowa, 3 m. above the mouth of Rock river, and 160 m. W. by S. of Chicago; pop. in 1850, 1,711; in 1860, 5,130; in 1870, 7,890; in 1875, estimated by local authorities at 12,000. It is opposite the W. extremity of Rock island, from which it derives its name. This island, the property of the United States, is 3 m. long, covering 960 acres, is well timbered, and has graded avenues and handsome drives. During and previous to the Black Hawk war it was the site of Fort Armstrong, a series of block houses, and during the civil war an extensive prison for the detention of confederate prisoners of war was situated upon it. Here is the Rock Island arsenal and armory, intended to be the central United States armory. The design embraces ten immense stone workshops, with a storehouse in the rear of each, besides officers' quarters, magazines, offices, &c. Four

of the workshops are already completed (1875). The shops will be supplied with motive power from the Moline water power, three fourths of which is owned by the government. The main channel of the Mississippi is N. of the island. Across the S. channel, from the upper end of the island to Moline, Ill., a dam has been constructed by the United States government, affording extensive water power. The Moline water power is 2 m. E. of the city of Rock Island; the Milan water power in Rock river, 3 m. S. of it. Rock Island is the headquarters of the Rockford, Rock Island, and St. Louis railroad, the S. W. terminus of the Western Union railroad, the W. terminus of the Peoria and Rock Island railroad, and a station on the Chicago, Rock Island, and Pacific, and the Chicago and Southwestern railroads, which here cross the Mississippi on the railroad and wagon bridge built by the government in connection with the arsenal. The railroads and river afford excellent facilities for shipment, and the abundant water power gives ample opportunity for manufactures. The principal establishments are a plough and cultivator factory, a stove foundry, a window-glass establishment, a cotton factory, three lumber mills, and three breweries. There are three national banks, a private bank, four large public school buildings, four denominational schools, two newspapers with daily and weekly editions, and 13 churches, viz.: African Christian, Baptist, Christian, Episcopal, German Lutheran, Methodist, Presbyterian (2), Roman Catholic (2), Swedish Baptist, Swedish Lutheran, and United Presbyterian. Augustana college, a Swedish Lutheran institution, is situated here.

ROCKLAND, a S. E. county of New York, bordered E. by the Hudson river and S. W. by New Jersey, and drained by the Hackensack and Ramapo rivers and several smaller streams; area, 208 sq. m.; pop. in 1870, 25,213. It has a rough and mountainous surface, the highest summits having an elevation of 1,000 ft., and the soil is fertile. Red sandstone is extensively quarried, and immense quantities of lime and brick are made. Rockland lake, about $\frac{1}{2}$ m. from the Hudson, and 160 ft. above the river, is noted for its yield of ice. The county is intersected by the Erie and Northern New Jersey railroads. The chief productions in 1870 were 12,944 bushels of rye, 57,046 of Indian corn, 30,781 of oats, 11,987 of buckwheat, 85,694 of potatoes, 11,188 tons of hay, and 144,588 lbs. of butter. There were 1,604 horses, 2,271 milch cows, and 1,420 swine; 5 manufactories of boots and shoes, 34 of brick, 1 of cotton thread and twine, 1 of gold leaf and foil, 4 of iron castings, 2 of machinery, 4 of brick and stone, 1 of wooden ware, 1 of woollen goods, and 1 brewery. Capital, New City.

ROCKLAND, a city and the county seat of Knox co., Maine, on the W. side of Penobscot bay, at the terminus of the Knox and Lincoln railroad, 40 m. S. E. of Augusta, and 50 m. S. S. W. of Bangor; pop. in 1870, 7,074. The har-

bor is broad and deep, and there is a very active trade, particularly in the exportation of lime, made from immense quarries of limestone in the vicinity. There are about 80 kilns, employing 1,000 men, and producing 1,200,000 barrels annually. Ship building is also carried on, and there are manufactories of boots and shoes, carriages, cooperage, edge tools, iron castings, harness, machinery, trunks, &c. The city has a fire department, water works, three hotels, two national banks with a joint capital of \$250,000, a state bank with a capital of \$50,000, a savings bank with about \$900,000 deposits, graded public schools, two weekly newspapers, and eight churches, viz.: Baptist (2), Congregational, Episcopal, Freewill Baptist, Methodist, Roman Catholic, and Universalist.—Rockland was set off from Thomaston and incorporated as a town, with the name of East Thomaston, in 1848. The name was changed in 1850, and in 1854 a city government was organized.

ROCKS, in geology, the solid mineral masses which make up the earth's crust. These may be considered both geologically and mineralogically; mineralogy is the natural history of all such bodies as do not belong to the organic kingdoms of nature. In the geological investigation of rocks two questions arise: first, as to their structure and attitude and the mode of their arrangement in the earth's crust, whether stratified or unstratified, whether occurring in beds, veins, or intruded masses; and second, their origin and mode of formation. The geognostical relations of rocks, and the distinctions of crystalline and uncrystalline, of stratified and unstratified, of indigenous, exotic, and endogenous rocks, have been defined in the article **GEOLOGY**. Mineralogically rocks may be homogeneous or heterogeneous; that is to say, they may consist of one or of two or more mineral species. Thus a pure white marble is made up entirely of calcite, a form of carbonate of lime, and quartzite consists of the mineral quartz, both homogeneous; while granite is heterogeneous, consisting of a mixture of quartz and feldspar, sometimes with the addition of mica or of hornblende. (See **GRANITE**.) These component mineral species are sometimes so arranged as to show that the rock has resulted from an original crystallization, as in the case of granite or vitreous quartzite; and at other times, as in the case of sandstones and conglomerates, the aggregate is seen to be composed of the ruins of such rocks rearranged and cemented together. Hence the great distinction between original and derived rocks, the former including all exotic or eruptive rocks and all endogenous rocks or veinstones, as well as the crystalline indigenous rocks. Certain rocks owe their origin directly to the accumulations of organic structures; such are coal, which consists of vegetable remains, many limestones, which are made up of corals, shells, or encrinurites, and certain silicious beds composed of the

shields of diatoms. We have thus a distinction, which is sometimes made, of chemically, mechanically, and organically formed rocks. The chief mineral species of original rocks are calcite, dolomite, gypsum, anhydrite, rock salt, quartz, orthoclase, albite and the related triclinic feldspars, nepheline and certain zeolites, the micas, chlorites, talc, serpentine, olivine, pyroxene, hornblende, garnet, epidote, staurolite, kyanite, andalusite, tourmaline, graphite, magnetite, hematite, corundum, and pyrite. A few of these form rocks by themselves; others are essential ingredients of composite rocks; while others occur as accessory though characteristic minerals in certain rock masses. The compound or heterogeneous rocks can be accurately defined only by describing the component minerals, their proportions and mode of arrangement, and the texture and structure of the mass. Arbitrary names have been given to certain types of composite rocks, but the student soon learns that there are many intermediate varieties and admixtures which it is difficult to name or to classify. In describing rock masses the geognostical distinctions of indigenous, exotic, and endogenous are to be disregarded, as in very many cases it is impossible from the study of a specimen to say to which division it belongs. Thus we have indigenous and endogenous crystalline limestones, and in the case of granitic rocks the characters of indigenous, endogenous, and exotic are often so similar that it is only by study of the rock *in situ* that it can be determined to which class it belongs. The structure of original rocks is not always crystalline; some, like pearlstone and obsidian, being glass-like and amorphous. Others, though crystalline, are so finely grained as to be compact, and are designated as crypto-crystalline. To rocks in which distinct crystals are imbedded in a compact or crypto-crystalline base the name of porphyry is given, and this is sometimes extended to rocks in which the base enclosing the crystals is not compact. The terms gneissic and granitic, or gneissoid and granitoid, are sometimes employed to designate rocks which, although unlike in composition, resemble gneiss or granite in structure and texture. The principal homogeneous original rocks are those composed of quartz, of carbonate of lime, and of dolomite. Gypsum, the ores of iron, and occasionally certain silicates, such as labradorite, serpentine, talc, and chlorite, form by themselves considerable rock masses. The most important indigenous rocks are heterogeneous, and foremost among these may be named those essentially made up of quartz and orthoclase feldspar, constituting the granitic rocks, which generally include mica or hornblende as an accessory mineral. The indigenous banded rocks of this composition take the name of gneiss, and are either hornblende or micaceous, the latter passing into mica schist, so common with gneiss in the Montalban or White mountain series. By the

admixture in the hornblende varieties of a triclinic feldspar (albite, oligoclase, or labradorite), which finally replaces the orthoclase, and the disappearance of the quartz, we get the rock known as diorite; and the substitution in such a rock of some form of pyroxene for hornblende produces what are known as dolerite and diabase. To these last named three rocks belong most of the so-called traps, basalts, and greenstones, which are generally intrusive or exotic rocks, although indigenous rocks, composed of triclinic feldspars with a greater or less admixture of hornblende or of pyroxene, are abundant. Chlorite often accompanies the hornblende of these rocks, or replaces it, especially in the Green mountain or Huronian series, where such rocks are associated with strata in which a soft hydrous mica prevails, forming the so-called talcose slates, which seldom contain talc. Rocks composed chiefly of labradorite, sometimes without admixture, and at other times with small portions of hypersthene or of pyroxene, predominate in the Norian series. Under the title **VOLCANO** will be considered the history of volcanic rocks, and there and under **WATER** will be discussed the chemical agencies which have produced the various rocks, the genesis of which cannot be well understood without a reference to the chemico-geological effects of fire and of water. Much has been done of late in the minute study of the crystalline rocks, and here the microscope has been used with much success.—Among the best works on the subject of lithology are those of Bernhard von Cotta, Senft, and especially Zirkel.

ROCKWALL, a N. E. county of Texas, watered by affluents of Trinity and Sabine rivers, formed since the census of 1870. It consists chiefly of undulating prairies, and has a good soil. Capital, Rockwall.

ROCKY MOUNTAIN LOCUST, an insect belonging to the same family (*locustidae* of Westwood, *acrididae* of later authors) as the locusts of the old world and of Scripture. It is the only species in this country, E. of the Rocky mountains, that has the same migratory habit and great power for harm which characterizes those whose ravages are described by the prophet Joel, and which have figured so largely in the history of southern European and Asiatic nations. A species often complained of on the Pacific slope is probably the same, or a variety of the same. The Rocky mountain locust, first specifically characterized by Prof. Cyrus Thomas, in his "*Acrididae of North America*" (1873), as *caloptenus spretus*, is popularly known as the grasshopper, a term loosely applied to most large hopping insects. During 1873, 1874, and 1875 this insect attracted unusual attention, and in the unprecedented amount of injury and suffering which it entailed on the farmers of the west it proved a national calamity. In 1873 Minnesota and Iowa were sorely scourged by it in their western counties, and had to appeal to the nation

for assistance to relieve the consequent suffering; in 1874 Nebraska and Kansas suffered to such an extent that the efforts of the state authorities and the contributions of people from all parts of the Union were insufficient to prevent a vast amount of distress; while in



FIG. 1.—Rocky Mountain Locust (*Caloptenus spretus*).

the spring of 1875 parts of Missouri and Kansas were again terribly smitten. It has been estimated that \$50,000,000 would not cover the loss occasioned to the country by this insect during these three years. The species measures on an average about $1\frac{1}{2}$ in. from the head to the tip of the closed wings, and the wings extend about one third their length beyond the tip of the abdomen. The color is variable, but the more common specimens are yellowish white beneath; glaucous across the breast and about the mouth parts; pale bluish glaucous, often with shades of purple, on the sides of the head and thorax and on the front of the face; olive-brown on the top of head and thorax; pale beneath, more or less bluish above and marked with black, especially toward base, on the abdomen. The front wings have the ground color pale grayish yellow, inclining to green, and their spots and veins brown; the hind wings, except a yellowish or brownish shade at apex and along the front edge and a green tint at base, are transparent and colorless, with the veins brown. The front and middle legs are yellowish. The hind legs have the thighs striped with pale glaucous and reddish on the outside and upper half of inside, with four broad black or dusky marks on the upper edge, the terminal one extending beneath around the knee. The shanks are coral-red with black spines; the feet somewhat paler, with black claws; antennae pale yellow; palpi tipped with black. In the dead specimens all these colors become more dingy and yellow. It very closely resembles, and is often confounded with, the red-legged locust (*caloptenus femur-rubrum*, De Geer), a species common to the whole central portion of the continent



FIG. 2.—Red-legged Locust (*Caloptenus femur-rubrum*).

from the Atlantic to the Rocky mountains, which, though capable of short flights, never commits the same havoc. This last is, on an average, smaller, darker, with shorter and less conspicuously spotted wings (seldom extending more than one sixth of their length be-

yond the tip of the abdomen), and the last abdominal joint of the male is bluntly cut off at the top, and not tapering and notched as in



FIG. 3.—Anal Characters of Male of Rocky Mountain Locust: *a*, side view of tip; *b*, *c*, hind and top views.



FIG. 4.—Anal Characters of Male of Red-legged Locust: *a*, side view of tip; *b*, *c*, hind and top views.

spretus. There is a third species, *caloptenus Atlantis* (Riley), occurring more particularly in the mountain regions of the Atlantic, which in many respects is intermediate between the two, and which often migrates in large swarms from place to place, and proves injurious during very hot dry years. All three approach each other so closely through divergent individuals that entomologists are at variance as to whether they should be considered distinct species, or mere varieties or geographical races of the same species. But compared with the Rocky mountain species, the others are harmless. This species seems to be subalpine by nature, and to breed and flourish only in the high plains and plateaus of the Rocky mountain region; and Prof. C. V. Riley is of opinion that those which devastate S. W. Dakota, Nebraska, Kansas, and the western portions of Minnesota, Iowa, and Missouri (in all of which country the species is not indigenous), come principally from the mountain regions of Wyoming, Dakota, Montana, and British America. According to his seventh annual "Report on the Insects of Missouri," "the insect is at home in the higher altitudes of Utah, Idaho, Colorado, Wyoming, Montana, N. W. Dakota, and British America. It breeds in all this region, but particularly on the vast hot and dry plains and plateaus of the last named territories and on the plains W. of the mountains; its range being bounded, perhaps, on the east by that of the buffalo grass. William N. Byers of Denver, Colorado, shows that they hatch in immense numbers in the valleys of the three forks of the Missouri river and along the Yellowstone, and how they move on from there, when fledged, in a S. E. direction at about 10 m. a day. The swarms of 1867 were traced, as he states, from their hatching grounds in W. Dakota and Montana, along the E. flank of the Rocky mountains, in the valleys and plains of the Black hills, and between them and the main Rocky mountain range. (See Hayden's "Geological Survey of the Territories," 1870, pp. 282-'3.) In all this stretch of country, as is well known, there are vast tracts of barren, almost desert land, while other tracts for hundreds of miles bear only a scanty vegetation, the short buffalo grass of the more fertile prairies giving way, now to a more luxurious vege-

tation along the watercourses, now to the sage bush and a few cacti. Another physical peculiarity is found in the fact that while the spring on these plains often opens as early, even away up into British America, as it does with us in the latitude of St. Louis, yet the vegetation is often dried and actually burned out before the first of July, so that not a green thing is to be found. Our Rocky mountain locust, therefore, hatching out in untold myriads in the hot sandy plains, 5,000 or 6,000 ft. above the sea level, will often perish in immense numbers if the scant vegetation of its native home dries up before it acquires wings; but if the season is propitious and the insect becomes fledged before its food supply is exhausted, the newly acquired wings prove its salvation. It may also become periodically so prodigiously multiplied in its native breeding place that, even in favorable seasons, everything green is devoured by the time it becomes winged. In either case, prompted by hunger, it rises in vast clouds in the air to seek for fresh pastures. Borne along by the prevailing winds that sweep over these treeless plains from the northwest, often at the rate of 50 or 60 m. an hour, the darkening locust clouds are soon carried into the more moist and fertile country to the southeast, where they fall upon the crops like a plague and a blight. Many of the more feeble or of the more recently fledged perish, no doubt, on the way; but the main army succeeds, with favorable wind, in bridging over the parched country which offers no nourishment. The hotter and drier the season, and the greater the extent of the drought, the earlier will they be prompted to migrate, and the further will they push on to the east and south." These vast flights never extend E. of a line drawn at a rough estimate along the 94th meridian; nor do they remain permanently in the low Mississippi valley country. The sudden change from the attenuated and dry atmosphere and general climatic conditions of 5,000 or 6,000 ft. above the sea, to the more humid and dense atmosphere of 1,000 ft., affects them injuriously, and they either leave, die, or disappear through degeneration or miscegenation, until no trace of them is left by the second or third generation. These incursions into the more fertile country to the east occur at irregular intervals, and are most frequent in the country toward the northwest, nearest the native home of the species. Thus, locust ravages are more to be feared in Colorado and W. Minnesota than in Missouri or Texas. A chronological study of these incursions shows that there have been during the present century only three as extended as that of 1874, when the insects reached into the western counties of Missouri. But we find records of a dire visitation in Guatemala as far back as 1632, in Gage's "West Indies," and the early Jesuit missionaries of California have left numerous records of locust injuries on the Pacific coast during the present and preceding

centuries.—The natural history of the Rocky mountain locust is similar to that of all true locusts. The female is furnished at the end of her abdomen with two pairs of horny valves, which open and shut, and which enable her to drill a hole in the ground in which to deposit her eggs. These, to the number of from 50 to 100, are voided in a glutinous fluid, which hardens and holds them together, and which, in

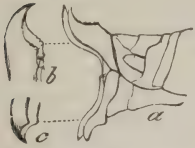


FIG. 5.—Anal Characters of Female of Rocky Mountain Locust, showing horny valves.

combination with particles of earth, covers them with a sort of pod. The eggs are deposited in the invaded country during the latter part of the growing season, and while some few may hatch prematurely the same season,

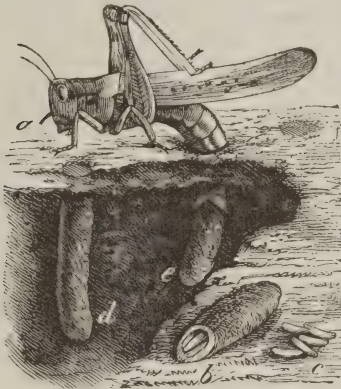


FIG. 6.—a. Female depositing eggs. b. Egg pod with end broken open. c. Eggs. d, e. Earth partially removed, showing an egg mass in place and one being placed. f. Place where such a mass has been covered up.

the great bulk of them do not hatch till the following spring. The young locust has the general characteristics of the mature insect, and differs principally in lacking wings. After shedding its skin at four different periods, the



FIG. 7.—a. Newly hatched larvæ. b. Full-grown larva. c. Pupa.

wings are acquired in from six to eight weeks from the time of hatching. It is doubtful whether in their native home the insects show any tendency to migrate except when forced by necessity. They are sluggish in the cooler parts of the day, and fly principally between

the hours of 10 A. M. and 4 P. M., and then only when the wind is in the direction they wish to go. Their life is limited by the spring and autumn frosts, and all that hatch in the spring perish at the approach of winter, soon after the eggs are laid. The young "hoppers" in the invaded country often abound to such an extent that they totally destroy all crops. In the spring of 1875, in several of the western counties of Missouri, especially in the middle portion of the state, and in the adjacent part of Kansas, the ground was kept as bare as in midwinter for nearly two months after spring opened, nothing green being left but the leaves on the forest trees, and a small glossy-leaved plant, the *amarantus blitum*, which they invariably left untouched. When not too hard pressed for food, they will pass by most species of milkweed (*asclepias*), as also the wild grass on low prairies. The distress caused by these insects in the part of Missouri mentioned, combined with previous short crops from drought and the chinch bug, made public measures of relief necessary; and, although the state entomologist insisted that the infliction was temporary and limited to its present area, many persons emigrated, and a day of fasting and prayer was appointed by the governor. These young hoppers travel during the hotter hours of the day in immense schools, not in any particular direction, but in search of food. They walk and hop alternately, moving at the rate of about three yards a minute. Toward evening they go to feeding, and generally collect afterward on fences or other objects away from the ground, so as to avoid moisture. As they grow older their numbers are continually reduced, not only by the attacks of enemies and by climatic influences, but by devouring one another; for when they are swarming to so unnatural an extent this cannibalistic propensity is fully developed. Those which acquire wings instinctively go toward their native home, or in the direction whence their parents had come the previous year. This exodus begins in Missouri early in June, and reaches its acme about the middle of that month. They generally leave in time to enable the farmers to raise a good crop of corn and of most vegetables. Indeed, the distress and devastation is not unfrequently followed, as in 1875, by great abundance. The incursions generally take place after two or three years of excessive drought, and are likely to be followed by a comparatively wet season. Aside from this somewhat uncertain cause, the total destruction of the vegetation during the first six or eight weeks of spring well nigh exterminates many other insect pests, such as the chinch bug; and the manure left by the locusts, in the very best condition to be appropriated, increases in many cases the fertility of the soil. Not only is there no danger of this plague ravaging the country E. of the 94th meridian, but there is none of its becoming a permanent evil in any part of the Mississippi valley proper.

Some curious changes often follow the wake of these locusts, where they denude a country of its vegetation. Thus, the common purslane gets a start over other weeds, and the large green and black larvæ of a common and pretty hawk moth (*deilephila lineata*), which feed upon it, abound to such an extent as to frequently cause unnecessary alarm. But the most striking change is the appearance of a fine grass unnoticed during ordinary seasons, which furnishes abundant and nutritious food for stock. This grass is the *vilfa vaginæflora*, an annual which is common from the Atlantic to the Rocky mountains. The locusts kill out the blue grass by gnawing it down too closely, and the changed conditions give the *vilfa* temporarily the advantage in the struggle for existence; but in a year or two the normal relations between species are restored.—The parasites which aid man in subjugating



FIG. 8.—Locust Mite, greatly enlarged.



FIG. 9.—Silky Mite. Natural size at side.

this locust consist mainly of four species, two mites and two flies. The silky mite (*trombidium sericeum*), a small scarlet animal about two lines long, attacks the egg underground; while the locust mite (*astoma gryllaria*), a still smaller species, of similar color, fastens in numbers on the body at the base of the wings of the mature insect. The anonymous tachina fly (*tachina anomyma*), an insect twice



FIG. 10.—*Sarcophaga carnaria*: a. Larva. b. Pupa. c. Fly. (The hair lines show average natural lengths.) d. Enlarged head and first joint of larva, showing curved hooks, lower lip (g), and prothoracic spiracles. e. End of body of same, showing stigmata (f) and prolegs and vent. h. Tarsal claws of fly, with protecting pads. i. Antenna of same, enlarged.

as large as a house fly but somewhat resembling it, fastens its eggs to both the young and the mature locusts; the maggots hatched from these penetrate the body and devour the vitals of their victim, soon causing its death. Finally the common flesh fly (*sarcophaga car-*

naria) deposits living maggots under the wings of the locust, which also in time succumbs to them.—A partial remedy against the locust, in regions where it is not indigenous, is found in natural agencies. Climatic conditions are often unfavorable, and many animals and insects prey upon it. Almost all the birds of the western plains feed upon the locust and its eggs. The protection of the prairie chicken and quail would be an excellent measure. A better means of preventing its ravages is the destruction either of the eggs or of the unfledged young. The eggs being laid in masses just beneath the surface of the soil, usually on high, dry ground, simple harrowing or shallow ploughing will break up the masses and expose the eggs to the desiccating and bleaching effects of the atmosphere, which are fatal to them. If deeply turned under by the plough, many of the eggs will rot, and the rest will hatch too late for the young to do serious damage. Ground thus treated should not be turned again in the spring. A few days' excessive moisture is also fatal to the eggs, and where irrigation is practised they may be very easily destroyed. The eggs, however, are often placed where none of these means can be employed. After hatching, the young hoppers may be destroyed by heavy rolling, by collecting them into heaps and burning them with coal oil, or into windrows of straw, which is then set on fire. The most effectual way of destroying them is by ditching, especially where there is no hay or straw in which to burn them, as in western Missouri in 1875. A ditch 2 ft. wide and 2 ft. deep, with perpendicular sides, is an impassable barrier to the young insects. They tumble in, and as they accumulate die at the bottom. To prevent the intolerable stench, pits or side ditches should be dug into which they may be swept and buried. Hogs and poultry may also be turned out to feed upon them. Prof. Riley urges as a possible means of preventing locust incursions, that a thorough study of the insect in its Rocky mountain breeding places be made by the national government; for "by learning just when and how to strike the insect so as to prevent its undue multiplication there, . . . we may hope to protect the fertile states to the east from future calamity."—From time immemorial locusts have been used as food in oriental countries, and it has been found that the Rocky mountain species makes a very good soup or bisque.

ROCKY MOUNTAINS, a name applied indefinitely to a long series of mountain ranges west of the Mississippi, of a great variety of form and structure. The term Stony mountains was originally used without the intention of applying it to any one range or group of ranges. From the eastern slope, westward, we pass over range after range for 1,000 m. or more, until we descend the western slope of the Coast range to the Pacific. At least two thirds of the United States, an area of over 2,000,000

sq. m., lies west of the Mississippi, and this vast area may be defined as the Rocky mountain region. This great group of ranges extends southward through Mexico and Central America to the isthmus of Darien, and northward into British America and Alaska to the Arctic ocean. The great chain of the Andes of South America is an extension of the same group, and in a general view they all form one great system. Not till within the present century was there any definite understanding of the geography of the Rocky mountains. Upon the old maps the mountain ranges were shown by a single line of hachures, with a few minor ranges branching off, the whole trending nearly N. and S., or rather W. of N. and E. of S. The first important government expedition was that of Lewis and Clarke, which in 1804-'6 passed up the Missouri river to its source, crossed the main divide of the Rocky mountains, and followed the Columbia to its entrance into the Pacific ocean. Although this expedition was a great achievement in a geographical point of view, taking into consideration the time and the means at its command, yet much of the information it obtained was very vague and limited to a narrow belt across the northern portion of the country. Lewis and Clarke, however, fixed pretty well the positions of the Missouri and Columbia rivers. The next explorer was Major Z. M. Pike, who in 1805-'7 crossed the country further south, and discovered the head waters of the Arkansas and the lofty peak which now bears his name. He crossed the divide into the Great Basin. In 1819-'20 S. H. Long was sent out by the government with a well equipped party, comprising not only topographers, but also geologists and naturalists, including Thomas Say. After Long came Bonneville, Ross Cox, Schoolcraft, Nicollet, Fremont, and others, all of whom added to the store of knowledge in regard to this great area. From 1844 to 1860 more than 20 expeditions were sent out, with the object of determining the best route for a railroad to the Pacific. In 1853 congress passed the bill making appropriations for the determination of the most practicable route for a railroad from the valley of the Mississippi to the Pacific coast. No expense was spared in equipping expeditions, which traversed the country from E. to W., at various points from lat. 49° to the southern boundary of the United States. The information thus obtained was embraced in a large series of maps and reports (13 vols. 4to). Yet up to 1865 no portion of the great Rocky mountain region had been examined with such care and detail as to render the maps anything more than approximately correct. The information thus obtained could only be placed on a map projected on a small scale, where an error of five or ten miles would be overlooked. Within the past ten years several expeditions have been organized with the object of working out certain areas with considerable detail, including topography, geology,

and natural history; and more definite knowledge of the Rocky mountain region has been obtained within that period than in all the previous years.—To convey an idea of the plan and growth of the development of the great area west of the Mississippi, it is only necessary to suppose it to have been originally a vast plateau, out of which have been evolved the different ranges of mountains as if they had been lifted by volcanic action. Indeed they appear as wrinkles on the earth's surface, and were probably produced by the contraction of its crust in the process of cooling. This may be understood more clearly by examining some of the barometrical profiles which have already been constructed across the continent. In proceeding westward along the Missouri river, the ascent is gradual, at first not more than one foot in a mile, but steadily increasing until the base of the mountains is reached, when the rise becomes suddenly 50 to 100 ft. or more in a mile. The profile of the Pacific railroad shows that Omaha on the Missouri river is 1,060 ft. above sea level, while at Columbus, 91 m. by rail westward, the elevation is 1,470 ft., showing an ascent of about 4½ ft. in a mile. At Cheyenne, 516 m. W. of Omaha, the elevation is 6,075 ft., showing an ascending grade from Omaha of nearly 10 ft. in a mile. This entire distance is over an apparently level plain, most of the way by the valley of the Platte. From Cheyenne to the highest point along the line of the railroad, at Sherman, 8,271 ft., the distance is 33 m., when the grade suddenly increases to over 66 ft. in a mile. The profile along the Kansas Pacific railroad, from Kansas City on the Missouri to Denver, shows similar results. At Kansas City the elevation is 764 ft.; at Denver, 639 m. W., 5,197 ft., making an average ascent of nearly 7 ft. per mile across an apparently level, treeless plain. A few miles W. of Denver, the great Colorado or Front range seems to rise abruptly out of the plains, its summits reaching the line of perpetual snow.—The great mass of the Rocky chain lies W. of the 105th meridian. The united ranges trend about 20° W. of N. Along the eastern slope the smaller or minor ridges have a trend more to the northwest, so that they constantly die out in the plains, giving to the eastern side the appearance of an echelon arrangement. As the small ridges run out, they often present a fine example of an anticlinal, as seen on the Cache à la Poudre river. From the notches in the outline of the ranges, the Platte, Arkansas, and many other rivers open into the plains. About the source of the Missouri the main chain is 9° of longitude further W. than in Colorado. In this broad space and to the eastward are numerous outliers, as the Black hills, Big Horn, Bear's Paw, Judith groups, &c., all more or less distinctly connected with the main chain. The Black hills are connected with the Laramie range, near the Red Buttes, by an anticlinal valley, while the Big Horn

is related in the same way, showing that they are all the product of one uniform cause. The Black hills are in Dakota territory, extending into Wyoming, E. of the Big Horn range, between lat. 43° and 45° , and lon. 103° and 105° , and are quite isolated from the main chain; they are a sort of huge puff from out of the plains, occupying an area of about 100 m. in length and 60 m. in breadth. The mass is elliptical, and the major axis trends about 20° W. of N. The base of the hills is 2,500 to 3,000 ft. above the sea, while the highest peaks are not more than 6,000 or 7,000 ft. They are covered with a dense growth of pine, which gives them a black appearance in the distance. The two forks of the Cheyenne embrace the Black hills, and have their origin in the plains far to the westward; hence they give rise to no important stream. The nucleus of the hills is composed of feldspathic granites and slates surrounded with the full series of the sedimentary strata known in this region, inclining at various angles from the central mass, as if originally their sedimentary beds had formed an unbroken communication across the entire area; or in other words, they form a fine example of an anticlinal on a large scale. There is some good pasture and timber land in the vicinity of the Black hills, but the mineral resources have been extravagantly overrated. Like the Black hills, the Big Horn range does not give rise to any important stream. The largest river in this region, which gives name to the mountains, rises in the Wind River range, passes through the Big Horn mountains, and flows into the Yellowstone about 70 m. to the northward. The central mass of this range is coarse granite also, with a series of Silurian, carboniferous, Jurassic, cretaceous, and tertiary strata, inclining from the sides. The highest peak is Cloud peak, supposed to be about 7,300 ft. We may separate the nuclei of the mountain ranges roughly into three divisions: those with a granitic and those with an igneous nucleus, and those with a combination of the two. Usually the volcanic material has come up through the granitic mass and flowed over it, in some instances almost entirely concealing it. Still further W. is the Wind River chain, the loftiest peak of which Fremont, whose name it bears, found to be 13,570 ft. The central mass of the mountains is also a coarse, massive granite, overlaid by metamorphic slates, in which the gold mines are found. This chain forms a portion of the main divide. —To the north of the Wind River mountains, in the N. W. corner of Wyoming territory, is one of the most interesting and remarkable regions in the world. The Yellowstone national park occupies an area of 65 m. from N. to S. and 55 m. from E. to W., or 3,575 sq. m., the whole of which is more than 6,000 ft. above the sea. The Yellowstone lake, the source of the Yellowstone river, is 22 m. long and 12 to 15 m. wide, and is 7,788 ft. above the sea. The ranges of mountains that hem it

in on every side are all of volcanic origin, and are covered with snow all the year. There is frost here every month of the year, and in June, July, and August the thermometer frequently sinks to 25° . (See WYOMING.) In a geographical point of view this park will always be of the highest interest, as constituting the apex of the continent, and giving origin to three of the largest rivers in North America. On the N. side are the sources of the Yellowstone; on the W. those of the three forks of the Missouri; on the S. W. and S. those of Snake river, flowing into the Columbia and thence into the Pacific ocean, and those of Green river, rushing southward to join the great Colorado, and finally emptying into the gulf of California; while on the E. side are the numerous sources of Wind river. —Southward from the Wind River chain, the mountainous character of the divide is interrupted for a short distance by comparatively level plateaus, while to the east are the Laramie plains, bounded by a comparatively low range, of which Laramie peak is about 10,000 ft. high, and, on account of its isolation and the insignificance of the mountains in the vicinity, is one of the great landmarks of the west. Still further S. are the remarkable mountain regions and the parks of Colorado. The Colorado or Front range rises up before the traveller on the plains like a gigantic wall, with Long's peak at the north and Pike's peak at the south, as high bastions. West of this range are three great depressions, North, Middle, and South parks. In the Front range are several peaks over 14,200 ft. high (according to the latest surveys): Long's, 14,271 ft.; Evans, 14,330 ft.; Rosalie, or Rosa, 14,340 ft.; and Gray's and Torrey's, twin peaks with an interval of less than a mile, 14,341 and 14,336 ft. In this range are the oldest known silver and gold mines of Colorado. On the W. side of the parks is the Park range, in which are several peaks of over 13,000 ft., and a few, as Mt. Lincoln, of over 14,000 ft. In this range are many important gold and silver mines. From Mt. Lincoln, on the W. side of the South park, one can look down into the valley of the Upper Arkansas and across to the Sahwath range, one of the most remarkable in the west. At its N. end is the Holy Cross group, in lat. $39^{\circ} 30'$, lon. $106^{\circ} 33'$, composed of gneiss and coarse massive granite. For 80 m. to the southward this range literally bristles with peaks, many of which rise over 14,000 ft.; Harvard, Yale, and Princeton are respectively 14,384, 14,150, and 14,199 ft., and many others are over 13,000 ft. The rocky mass is mostly granite, intersected with igneous dikes. The general trend of this range is about 20° W. of N., and it forms one of the most gigantic anticlinals in the entire Rocky mountain region. Vast ranges of massive granitic rock, capped with limestone and sandstone, incline from either side, with broad valleys intervening. The proofs of ancient glacial action on both sides of the range are wonderful. In the val-

ley of Roches Moutonnés creek, which flows into Eagle river from its N. E. base, are very remarkable rounded masses of granite, such as have long been called sheep backs or *roches moutonnés* in the glacial regions of central Europe. Here they are shown on a grand scale. In the valley of the Arkansas and the Gunnison are marvellous examples of lateral and terminal moraines, and there are numerous lakes whose basins have been scooped out by some extended glacial action. The Twin lakes are beautiful sheets of water on the E. side of the Sahwatch range, 2 to 3 m. in diameter and about 80 ft. deep. These are true glacial lakes. The proofs of glacial action are common throughout the Rocky mountain region, but they are nowhere shown to such a marked extent E. of the Sierra Nevada as in the vicinity of the Sahwatch range. From the W. side of this range flow the Gunnison river and southern branches of the Grand, which, after cutting deep cañons or gorges, unite near the western boundary of Colorado; and cutting a still deeper cañon, the stream flows into the great Colorado of the West.—West of the Sahwatch or great "Mother" (Madre) range is another remarkable group in the drainage that leads to the great Colorado, called the Elk range. It is about 50 m. in length, with a trend about N. W. and S. E., and differs from any of the others mentioned both in form and structure. In this range are seven peaks of the first order, rising to an elevation of nearly 14,000 ft., and many others ranging from 12,000 to 13,000 ft. The geological structure is very peculiar. It appears that the vast thickness of sedimentary strata once rested upon a floor of igneous granite in a pasty or semi-pasty condition, and that these high peaks were thrust up through the overlying beds, in many instances completely overturning them for miles in extent. There are faults 2,000 ft. in extent, and dikes without number, where the igneous material seems to have been squeezed through fissures in the thousands of feet of overlying strata, vertically as well as horizontally. Deep gorges and amphitheatres meet the eye on every side. Snow Mass peak, 13,961 ft. high, is so called from the immense mass of perpetual snow on its sides. At its immediate base, on all sides, are beautiful lakes. The surface is remarkably rugged, and as far as the eye can reach on every side are high peaks with deep gorges in one continuous succession, while the sedimentary rocks are thrown into chaos. On the N. W. end of the range is a remarkable peak which forms an excellent landmark, known among the miners and prospectors for years as Sopris peak, 12,972 ft. high. From this point the land slopes off into the remarkable plateau country bordering on the Colorado river, literally gashed as it were by the little streams which have cut innumerable cañons through it. There is probably no country in the world that presents more obstruction to the traveller.—At first glance the

Park range appears to be connected with the Sangre de Cristo range, which bounds the E. side of the San Luis valley, but the former is separated from the latter by the Arkansas valley, and really lies parallel with it. It begins in lat. $38^{\circ} 26'$, lon. 106° , trends S. 30° E., and shows on its summit a continuous series of sharp peaks. Parallel to it, on the east and bordering the plains, is the Wet mountain range. The interval is known as the Wet mountain valley and Huerfano park, one of the most beautiful and fertile districts in Colorado. These mountains extend far down into New Mexico. Southward the Sierra Blanca and Spanish peaks are lofty landmarks. Fort Garland, an old military post in the San Luis valley, is near the base of the Sierra Blanca. The San Luis valley, though nearly surrounded with high ranges, is not a park, but a valley 30 to 50 m. wide, through which the Rio Grande flows after emerging from the San Juan mountains, cutting a gorge through its basaltic floor 1,000 to 1,500 ft. in depth for 60 to 80 m.—Immediately W. of the upper portion of the San Luis valley, in S. W. Colorado, is a most interesting as well as lofty group of mountains, forming what is now called the San Juan district. These mountains form the sources of a great number of streams. On the north are many branches of the Gunnison, on the east the Rio Grande, and on the south and west the various branches of the Rio San Juan, which flows S. W. and W. and unites with the Colorado. Within an area of about 4,000 sq. m. is the most important and rugged group of peaks in Colorado, and probably in the first division of the Rocky chain. More than 100 points are above 13,000 ft., and about 10 peaks over 14,000 ft. On the N. side of the group is the lofty Uncompahgre or Uncapahgre peak, with its dome-shaped summit rising to a height of 14,235 ft. Large areas here are composed entirely of quartzites, and others wholly of igneous rocks. Toward the south, in southern Colorado and in New Mexico and Arizona, the volcanic action seems to have been very great, and the area covered with igneous rocks increases; sometimes they occupy several thousand square miles, to the exclusion of all others. What are called the broad table lands or mesas of New Mexico are simply floors of basalt. Colorado may be regarded as the culminating area of lofty points in the eastern division of the Rocky chain, as California is in the western, in its Sierra Nevada ranges. Within the limits of Colorado are 50 or more points exceeding 14,000 ft. in height, and more than 250 of over 13,000 ft., while the number reaching 12,000 ft. is unknown. The average elevation of Colorado is greater than that of any other state or territory in the Union, being 6,600 ft., while California with its magnificent group of peaks in the Sierra Nevada averages only 2,800 ft.—To the west, and walling in the great interior basin on the east, is the Wahsatch range,

which is unsurpassed for beauty of form. The scenery in the vicinity of this range has long been celebrated for its grandeur and beauty. Mt. Nebo, one of its prominent peaks and a noted landmark, is 11,992 ft. high. The trend of the range is nearly N. and S., while projecting like a spur toward the east is the Uintah range, with a trend nearly E. and W. and with a number of peaks over 13,000 ft. high. This is one of the most beautiful and symmetrical ranges in the west. The nucleus is composed of quartzites, which are so elevated that the central mass seems to have been lifted up horizontally or nearly so. The entire range is a remarkable example of a huge anticlinal, and on either side of the axis are the numerous pyramidal peaks, rising far above the timber line and covered with perpetual snow. Three distinct belts may be noted in this range: one above the timber line, revealing only the bare, bleak rocks; below, a dense belt of pine timber; and near the base and sloping off into the plains, another comparatively barren belt. The Wahsatch range has a gray granite nucleus, with a great thickness of sedimentary beds lying on the sides and often rising to the very summits. In the Great Basin, between the Wahsatch mountains and the Sierra Nevada, are many smaller mountain ranges lying nearly parallel with each other, some of which seem to rise abruptly out of the surrounding plateau. This great depression was undoubtedly at no remote period, geologically speaking, a lake of several hundred miles in extent, out of whose waters the summits of the mountains projected like islands. In the Shoshone basin, forming the E. portion of Oregon and the W. part of Idaho, are a great number of similar ranges, all lying parallel with each other, appearing like the waves of the sea after a storm. The Salmon River mountains, Blue mountains, and many others are composed of a series of remarkable regular ridges trending mainly N. and S.—The second division comprises the Cascade, Coast, and Sierra Nevada ranges, fronting the Pacific ocean, which were formerly included under the general term Rocky mountains, and are now called by some geographers the Cordilleras. These mountains, in their extension S. into Mexico, have long been known as the Cordilleras of Mexico, and the main ranges of South America bear the name of Cordilleras or Andes. Still, as all the mountains W. of lon. 105° are plainly a unity in a geographical view, they will fall under the general and quite indefinite term "Rocky mountains." North of lat. 49° but little is known of these western ranges; but it is known that they extend without any permanent interruption to the Arctic ocean, with here and there a lofty peak, which from ignorance of its precise character has been assigned what appears a greatly exaggerated elevation. The latest measurement by triangulation makes Mt. St. Elias 17,500 ft. high; Mt. Hood in Oregon and Mt. Baker, both of which are enor-

mous extinct volcanic cones, have an elevation respectively of 11,225 and 11,100 ft. The Cascade range is a continuation northward of the Sierra Nevada, and is separated only by the chasm of the Klamath river. Through the entire length of Oregon and Washington territory, the Cascade range runs N. and S. parallel to, and about 100 m. from, the shore of the Pacific. Near the 49th parallel it is bent northwesterly, conforming with the trend of the coast, and in British Columbia is called the Marine range. The average elevation is 5,000 to 6,000 ft. It obtained its name from the cascades of the Columbia, which are formed by the passage of that river through it. The country along the immediate coast is but a narrow belt, much broken, while the shore is indented with great numbers of bays or inlets, of which the estuary of the Columbia, Shoalwater bay, and Gray's harbor are noted. Promontories and rocky islets are visible everywhere as surviving monuments of the terrific erosion which has swept away entire mountain ranges, leaving at this time only the single group of the Cascade range.—South of Cape Mendocino, in lat. 40° 30', to Point Conception, near lat. 34° 30', the Coast range of California is composed of a succession of parallel ranges, with intervening valleys of great beauty and fertility. Between the Coast range and the Cascades is a longitudinal depression which forms the valley of the Willamette, extending northward to the gulf of Georgia. Similar valleys occur in California, as the San Joaquin and Sacramento. In this northern region the forests are very dense, and the undergrowth so thick that it is difficult to penetrate it. Trees occur of majestic size, of which the yellow fir (*abies Douglassi*) predominates over all others. The cedar (*thuja gigantea*) is also very abundant. The lumber interests of this country are immense. Between the Cascade and the main Rocky chain lies the basin of the Columbia, which is an arid plain covered with artemisia and bunch grass. The surface is cut through by deep cañons, through which the large rivers flow between huge walls of basalt. Although there are great varieties of climate in this division, it is extremely mild on the immediate coast. At Puget sound snow seldom falls, and remains but a short time. Rains are very abundant, reaching 60 inches during the year. According to Mr. J. D. Whitney, the Coast range inosculates with the Sierra Nevada both N. and S. Near Tejon pass, in lat. 35°, the ridges are topographically undistinguishable from each other, and it is only by carefully studying the position of the strata that it can be determined where one system begins and the other ends. The Coast ranges are composed of newer formations than the Sierra, and have been subjected to greater disturbances up to a recent period; and they contain no rocks older than the cretaceous. There are no lofty points in the Coast ranges, according to Whitney, the central portions rarely rising above 4,000 ft.,

while in approaching the Sierra N. and S. the highest points are as much as 8,000 ft. The well known Monte Diablo is only 3,856 ft. above the sea, although a very conspicuous object from San Francisco.—The Sierra Nevada or Snowy range forms the western border of the great continental plateau, corresponding with the main Rocky chain on the east. While the base of the eastern mass is everywhere 4,000 to 5,000 ft. above sea level, and the descent to the sea imperceptible to the eye, the Sierra slopes rapidly, so that the sea level is reached within 100 m. So far as now known, the highest peak of the United States is in the Sierra group, viz., Mt. Whitney, 14,887 ft. The scenery of the Sierra group is of surpassing beauty and grandeur. There is not such a vast number of high peaks as in the Colorado group, but it may fairly claim the highest; and inasmuch as the surrounding country has a much lower altitude, there is a massiveness about this magnificent range that even the Sawatch of Colorado cannot boast. The Sierra chain is about 450 m. in length, and averages about 80 m. in width, supposing its northern terminus to be at Lassen's butte, lat. $40^{\circ} 30'$. The central mass or core is chiefly granite, with metamorphic slates on either side, capped with basaltic and other kinds of lava and heavy beds of ashes and breccia. All these rocks are visible from the Central Pacific railroad between Truckee and Sacramento. The evidences of very modern volcanic action are visible everywhere. Even now there are numerous hot springs and geysers, as well as occasional earthquake shocks. The height of some of the dominating peaks is as follows: Mt. Shasta, 14,442 ft.; Mt. Tyndall, 14,386 ft.; Mt. Kaweah, 14,000 ft.; Mt. Brewer, 13,886 ft.; Red Slate peak, 13,400 ft.; Mt. Dana, 13,277 ft. On the mountains snow falls to the depth of 40 or 50 ft., and much of it remains all the year. Enormous glaciers exist here even at the present time, and the evidences of ancient glacial action are wonderful. The worn and rounded granites of the Sierra Nevada were well adapted to preserve the records of the old glaciers, and they everywhere testify to the intensity of their former power. These glaciers have been continued down to the present time in a modified condition. All the glaciers occur on the north side of the mountains, and are very numerous, now estimated at 65. The number known in the Alps is 1,100, of which about 100 may be considered as primary. Some of the Sierra glaciers are nearly as large as the Alpine, as the Lyell, North Ritter, and others not yet named. Although the existence of glaciers in the Rocky mountains is a very modern discovery, enough is already known about them to invest the subject with the highest interest. Moraines and morainal lakes occur in the Sierras in great numbers. Lake Tenaya, at the head of the Merced river, or a branch of the same name, is a conspicuous example. Traces of the existence

of an immense flow of ice are shown here in the valley occupied by the lake, according to Whitney, and the ridges on either side of the trail are so worn by glacial action that the rocks are slippery, rendering travel dangerous. Four pretty well marked belts of forest vegetation have been observed by Whitney. The lowest is the foot hills, with oaks, buckeyes, and small digger pines; the second belt lies between 4,000 and 5,000 ft., and consists of pitch pine (*pinus ponderosa*), bastard cedar, and Douglas spruce; the third zone, between 7,000 and 9,000 ft., is that of firs, as *picea grandis* and *amabilis*, tamarack pine, &c.; and on the highest belt, above 9,000 ft., where vegetation begins to dwindle, a dwarf pine (*pinus cristata*) is seen up to the limit of perpetual snow. There are great numbers of beautiful lakes in the Sierras, fed by the melting of the snows, among which are Lake Tahoe and Donner lake. The Yosemite valley, so remarkable for its rugged scenery, and which has been set apart by legislative action as a pleasure ground, is in the Sierra. Through this valley flows the Merced river, and at its source is a fine group of peaks, 13,000 ft. high, called the Merced group.—So far as structure and topography are concerned, the great mountain system extending along the western borders of the western hemisphere, from the Arctic ocean to Patagonia, may be regarded as a unit, and due to one great cause. North America has its lofty Rocky group opposite the deep North Pacific ocean, and its small Appalachian group opposite the shallower North Atlantic. So South America has its still higher Andes opposite the deeper South Pacific, and the smaller Brazilian ranges opposite the South Atlantic. This fact, stated by Dana, is founded on a deep-seated structural cause. The elevation of a portion of the earth's crust requires in close proximity a corresponding depression. The Rocky system may be primarily divided into two portions, the Sierra Nevada and Coast ranges fronting the Pacific ocean, and the main Rocky chain which forms the great water divide of the continent. Each of these chains or groups is made up of a great number of smaller ranges, in the aggregate apparently possessing a considerable degree of regularity, but when studied in detail showing very little regularity or system. Sometimes, as in the Great Basin, the main ranges seem to lie parallel for the most part, but usually the minor ridges branch off in every direction. More commonly the trend is about N. E. and S. W.; but sometimes it is due N. and S. or E. and W. The Wahsatch range in Utah trends nearly N. and S., while the Uintah range, which seems to branch off from it, trends nearly E. and W. The area W. of the Mississippi may be divided into mountain and prairie or plain country. The belt of plains on the E. slope averages about 500 m. in width, and gradually rises to the base of the mountains. The mountain portion has its greatest breadth between the 36th

and 41st parallels, where it varies from 800 to 1,000 m. In this belt are the greatest number of lofty peaks, including the highest portion of the Sierra Nevada.—Among the numerous ranges of the Rocky chain are many valleys and plateaus, varying from a few acres to hundreds or even thousands of square miles. Sometimes they are formed by erosion or by depression; many of them are ancient lake basins. In all the great mountain districts of the west are thousands of these openings, into which settlements have already penetrated. In the San Juan mountains is Baker's park, with an extensive settlement of miners, and in the surrounding mountains are some of the richest silver mines in America. The North, Middle, and South parks, in Colorado, are areas of depression underlaid with sedimentary strata and walled on every side by lofty mountain ranges; they are really old lake basins. The North park has a comparatively level surface, and an average elevation of 8,000 ft. S. of this, and only separated by a rather low mountain range, is the Middle park, which is much larger and far more rugged; indeed, there is very little of what might be called plain country, but a succession of high ridges, many of which are of volcanic origin. The average elevation is about 7,500 ft. Still further S., but separated by a much wider belt of mountainous district, is the South park, which is mostly a plain, with an average elevation of about 9,000 ft. In these parks there is frost every month of the year. (See COLORADO.) San Luis valley, in southern Colorado and northern New Mexico, has an average elevation of 7,000 to 8,000 ft. The Llano Estacado of Texas and New Mexico averages 3,200 to 4,700 ft. above sea level; the Colorado plateau in Arizona, 5,500 ft.; Salt Lake valley, Utah, 4,200 to 4,500 ft.; Laramie plains, Wyoming territory, 7,000 ft.; Snake river plain, in Idaho, 4,000 to 4,500 ft.; Sevier lake basin, Utah, 4,700 ft.; Humboldt river basin (Lassen's meadows), Nevada, 4,200 ft.; Carson river basin, 3,800 ft.; Walker's river basin, 4,100 ft.; and Mojave river basin, California, 1,100 ft. Comparing the mountain plateaus or basins of the Rocky mountain region with some of those in the Andean region of South America, the difference of elevation is very great. The Antisana plateau of South America is 13,451 ft.; the basin of Santa Fé de Bogotá, 8,413 ft.; and the basin near Lake Titicaca, 12,853 ft. Perhaps as great an extent of plateau is comprised in the belt between the 38th and 44th parallels of latitude as in any other portion of the Rocky area. Through this belt the Pacific railroad passes. From Omaha to Cheyenne the track lies nearly all the way on the most modern tertiary formations. From Cheyenne westward the road crosses the Laramie range, the highest point, Sherman, being 8,271 ft. After passing over about 15 m. of granite rocks, it descends into the Laramie plains. Thence to the Wahsatch range in Utah no more granitic

rocks are met with, only cretaceous or tertiary. In crossing the water divide at Creston, 7,030 ft. high, the stranger would not suspect that he was passing from the Atlantic to the Pacific slope. The road runs through the Wahsatch range at right angles, in the channel of the Weber river, with only 4 m. of granitic rocks, so that from Omaha to Ogden only about 18 m. of metamorphic rocks are met with. Thence the Central Pacific crosses the Salt lake basin, enters the Humboldt valley, and really meets with no mountains until it reaches the Sierra Nevada, where a most formidable obstacle presents itself in a massive granite mountain range, which however is crossed at an elevation of only 7,042 ft.—According to Messrs. Blake and King, there are seven longitudinal zones or belts of mineral deposits in the west, following the prevailing direction of the mountain ranges. Mr. King says: "The Pacific coast ranges upon the west carry quicksilver, tin, and chromic iron. The next belt is that of the Sierra Nevada and Oregon Cascades, which upon their W. slope bear two zones, a foot-hill chain of copper mines, and a middle line of gold deposits. These gold veins and the resultant placer mines extend far into Alaska, characterized by the occurrence of gold in quartz, by a small amount of that metal which is entangled in iron sulphurets, and by occupying splits in the upturned metamorphic strata of the Jurassic age. Lying to the east of this zone, along the E. base of the Sierras, and stretching southward into Mexico, is a chain of silver mines, containing comparatively little base metal, and frequently included in volcanic rocks. Through middle Mexico, Arizona, middle Nevada, and central Idaho is another line of silver mines, mineralized with complicated association of the base metals, and more often occurring in older rocks. Through New Mexico, Utah, and western Montana lies another zone of argentiferous galena lodes. To the east again the New Mexico, Colorado, Wyoming, and Montana gold belt is an extremely well defined and continuous chain of deposits." It has usually been understood that there is no coal in the true coal measures in the Rocky mountain district; but of late years a few thin seams have been reported as occurring in the south and southwest. In Colorado, Wyoming, Utah, Montana, and New Mexico, vast areas are underlaid by thick beds of coal belonging to the cretaceous and tertiary groups. In southern Colorado, New Mexico, and the interior of Utah, thick and important beds of coal are found in the cretaceous group, while along the E. slope of the Rocky chain in Colorado, as at Raton hills, Cañon City, Colorado Springs, Golden City, and northward, are numerous coal beds belonging to the lignitic group, eocene tertiary, which are now wrought to a large extent. In the northwest the lignitic area covers at least 100,000 sq. m. Along the Union Pacific railroad are coal beds of the same age, without which the railroad could not exist. Not less

than 20,000 tons a month are mined at Evanston, Rock Springs, and Carbon, in Wyoming territory, for the use of this road alone. From Coalville, Utah, E. of Salt Lake City, no remarkable beds of coal are found along the immediate vicinity of the Pacific railroad to San Francisco. The scarcity of tree vegetation in the Rocky mountain area renders this coal of vital importance to the present and future industries of the great west.—The timber line or highest limit of tree vegetation does not vary much in the main chain of the Rocky mountains. In Colorado and Utah it is from 11,000 to 12,000 ft.; in northern Wyoming and Montana, from 8,000 to 11,000 ft.; on Mt. Shasta, California, 8,000 ft.; while as far south as San Francisco mountain, Arizona, between lat. 35° and 36°, it is 11,547 ft. According to the observations made up to this time (1875), the timber line is lower to the far north. Between lat. 45° and 46° in Montana, it varies from 8,800 to 9,600 ft., while from lat. 40° to 35° it is quite uniformly from 11,000 to 12,000 ft. These statements may be regarded as approximately accurate, though more observations ought to be made.—The mean elevation along several parallels of latitude has been ascertained approximately. For instance, along the 32d parallel, between lon. 95° and 96°, the mean elevation is 500 ft.; the highest mean between 108° and 110°, in the Sierra Madre plateau, is 5,000 ft.; 35th parallel, first mean 650 ft., highest mean, between lon. 107° and 109°, at Zuñi mountains, 7,000 ft.; 39th parallel, first mean 1,000 ft., highest mean, between lon. 105° and 107°, in the Colorado, Sahwatch, and Elk ranges, 11,000 ft.; 41st parallel, first mean 1,000 ft., highest mean, between lon. 105° and 107°, Laramie range and South park, 8,000 ft.; 45th parallel, first mean 1,000 ft., highest mean, between lon. 108° and 110°, Big Horn mountains and Yellowstone range, 7,000 ft.; 48th parallel, first mean 1,500 ft., highest mean, between lon. 118° and 114°, the main Rocky chain, 4,000 ft. The mean elevation of Arizona is 4,200 ft.; of California, 2,800 ft.; of Colorado, 6,600 ft.; of Idaho, 3,800 ft.; of Montana, 3,950 ft.; of Nevada, 4,900 ft.; of New Mexico, 5,400 ft.; of Oregon, 2,700 ft.; of Washington territory, 1,800 ft.; of Wyoming, 6,450 ft.—In almost every state and territory W. of the Mississippi old lake basins exist, and from the sediments that were deposited in the bottoms of these lakes have been obtained the remains of a great variety of extinct animals, including camels, rhinoceroses, elephants, mammoths, crocodiles, huge saurians, turtles, birds, &c. In the vicinity of the Black hills of Dakota is a large area marked on the maps as Mauvaises Terres, or Bad Lands, so called on account of its ruggedness, in which thousands of extinct vertebrate animals were entombed. It was formerly a vast fresh-water lake, probably dating back at least to the beginning of the miocene period, and continuing through the pliocene nearly to the present time. During

this time at least two distinct faunal groups appeared on the earth, lived out the period of their existence, and perished. The first group, which lived during the miocene period, left not a single species to the pliocene, and the fauna of the latter furnished no species for our present period. In the Sweetwater valley, near the three forks of the Missouri, in Oregon, California, Texas, New Mexico, and Colorado, are similar lake basins filled with the remains of these extinct animals. On the Laramie plains, about Fort Bridger, and far S. on Green river, are lake basins of older date, referred to the lower miocene or upper eocene, in the deposits of which have been discovered the abundant remains of hundreds of extinct forms of vertebrate animals, entirely distinct from those just mentioned as of more recent age. Great quantities of fossil insects, fishes, and plants are found in these lake beds. Over 500 species of extinct forms of plants have been found, mostly in connection with the coal, indicating that at a comparatively modern period, geologically speaking, this great region, occupied with mountains and barren plains, was covered with forests as luxuriant as those of the gulf states. These plants belong mostly to the early tertiary period. The present scarcity of timber in the eastern and central portions of the continent is well known. The principal winds come from the west and northwest, and, as they pass over the summits of the different ranges of mountains from the Pacific coast eastward, laden with moisture, discharge a portion of it from summit to summit, until on the eastern slope the air is almost dry. The absence of timber is due to the absence of moisture, and the inference from the fact of the luxuriant forests existing in the Rocky region during the early tertiary period is that these high summits did not then exist.—The drainage areas of the west are well marked out. The Missouri river and its great branches, the Yellowstone and Platte, have their sources in the eastern portion of the Rocky range, and, gathering their waters from myriads of branches, flow at first E. across the dry plains, and gradually turn S. E. and join the Mississippi; the average rainfall in the upper Missouri drainage is 18 inches. The second drainage is that of the Arkansas further S., which rises in the Sahwatch and Park ranges of Colorado, flows S. to lat. 38° 30' and lon. 106°, then bends E. and flows across the plains to unite with the Mississippi; the average rainfall is 28 inches. The third system of drainage is still further S., that of the Rio Grande, which rises in the San Juan mountains of southern Colorado, flows S. through New Mexico and between Texas and Mexico, and empties into the gulf of Mexico; average rainfall, 16 inches. West of the last is the drainage of the great Colorado of the West, which, rising far north (in its branches the Green and Grand rivers), near the Yellowstone national park, flows S. and S. W. across Wyoming, Utah, and Arizona, and

empties into the gulf of California; the average rainfall in this vast area is only 15 inches. N. and W. of the Colorado drainage is the great interior basin, between the Wahsatch mountains and the Sierra Nevada, with no known outlet, the great rivers sinking; here the average annual rainfall is only 12 inches. To the north is the great drainage of the Columbia, the branches of which rise in the main chain of the Rocky mountains far to the east, in Idaho; the average annual rainfall is only 18 inches. There are several smaller areas of drainage on the Pacific coast. The limited rainfall in all these regions shows that successful agriculture is only possible with the aid of irrigation. E. of the Sierra Nevada the rains are not frequent, the snows are very light, and the amount not great, so that the supply of water from the melting of the snows is not extensive. The difference between high and low water mark is very great. For a short time in May and June the streams are high and large, but they soon dwindle greatly, and even disappear altogether. So little snow falls on the E. ranges that the streams which flow into the plains from the E. slope will not supply water to irrigate more than one fourth of the agricultural area.

RODENTIA (Lat., from *rodere*, to gnaw), an order of mammals characterized by the chisel shape of the incisors, adapted for gnawing the hard vegetable substances upon which they principally feed, such as the wood and bark of trees, hard-shelled nuts, and occasionally bony structures like ivory. Rodents are generally small, numerous in species, very prolific, and found in all parts of the globe. They are ungulated, and in most the hind parts of the body and limbs exceed the front in length, so that they leap rather than walk, in some (as the jerboa) the disproportion being so great that they resemble the kangaroos in their mode of progression; the skull is small and flat, with the jaws, especially the lower one, strong; the snout is usually provided with long moustaches; the opening of the mouth is small, but



Rodent Skull and Incisor.—a. Enamel. b. Dentine or soft tooth substance.

the cheeks often form large pouches in which they convey food to their burrows; the legs are short in most, for walking or climbing, in the flying squirrels provided with a membrane extending from the sides, which answers the purpose of a parachute; many, like the beaver

and muskrat, are excellent swimmers and divers; the thumb is never opposable, when present; the skin is ordinarily covered with soft fur, but sometimes interspersed with bristles or spines; tail hairy, or naked and scaly. It is by their dental character that the rodentia are most clearly defined as a natural order. The bow-shaped incisors, usually $\frac{1}{2}$ - $\frac{1}{2}$, grow from persistent pulps, and are covered with a coat of enamel only in the front; the *leporidae* (hares and rabbits) possess an additional pair of incisors in the upper jaw, situated directly behind the first and larger pair. The superior hardness of the enamel, which much more effectually resists the action of gnawing than the comparatively soft dentine, enables the rodents to retain unimpaired a sharp, chisel-shaped edge to their cutting teeth, the wearing away of the crown being constantly replaced by growth below. The loss or breaking of one of these incisors, leaving the growth of the opposing tooth unchecked by a resisting medium, results disastrously, frequently causing an interlocking of the jaws. There are no canines. The grinders vary in number from four to twelve in the upper jaw, and from four to ten in the lower. When the number in either jaw exceeds six, the supernumerary teeth immediately preceding the last triplet must be regarded as true premolars, supplanting a milk dentition; they are composed of cement, dentine, and enamel, and either form roots (thus limiting the duration of growth) or grow from persistent pulps like the incisors. The summits of their crowns are generally traversed by parallel transverse ridges, placed in opposition to the antero-posterior movement of the lower jaw, thereby greatly facilitating mastication.—The order comprises such animals as the capybara, beaver, porcupine, squirrel, marmot, dormouse, rat, hamster, lemming, jerboa, hare, rabbit, muskrat, Guinea pig, agouti, and chinchilla. Waterhouse divides them into the five families of *leporidae*, *hystriidae*, *muridae*, *sciuridae*, and *sacomyidae*, all represented in North America, and the last peculiar to it. Rodents form nearly one third of all mammals, and in North America one half of all the land mammals, this last containing about one fifth of all the described species; of the squirrels, nearly one third of all known species are found within the limits of the United States; the pouched rats are entirely American; of the rat family, the field mice are best represented in North America; of the porcupine family, more than seven eighths are South American, the capybara, the largest living rodent, being among them, itself greatly surpassed in size by the extinct *castoroides Ohioensis* of North America; while many species of hares are found in North America, only one is met with in South America.—This order is generally considered as displaying very little intelligence, though manifesting (as the beaver) some of the most remarkable instincts; but the rat certainly shows an adaptation of

means to ends, under circumstances often the most unnatural and unexpected, which makes it hard to draw the line between animal instinct and intelligence. There is in many an extraordinary development of the sexual appendages, some of which are very complex and peculiar to the order; the testes are generally larger than the kidneys, and in most are not contained in a scrotum, but beneath the skin of the perineum; the intromittent organ is variously directed, with an internal bone, and in some armed with a formidable apparatus of horns, spines, and serrations; the preputial glands are often largely developed, secreting in the beaver the drug *castoreum*, once much used as an antispasmodic; the uterus is two-horned; the mammary glands vary from 4 in the Guinea pig to 12 or 14 in the agouti. Rodents have existed from the earliest tertiary epoch, presenting genera sometimes different from, and sometimes the same as the present.

RODERIC, the last Visigothic king of Spain, a son of Theodefred, duke of Cordova, fell in battle about the close of July, 711. He became king about 709, after driving Witiza from the throne. The sons of the latter and their uncle Orpas, archbishop of Seville, invoked against Roderic the assistance of the Arabs, who gained possession of Ceuta through the treachery of Count Julian, governor of Andalusia. Roderic roused the people to arms. His forces were vastly superior in number to those of the invaders under Tarik; but in the battle of Jerez de la Frontera, which is said to have lasted eight days, he was betrayed by the sons of Witiza, whom he had placed in command of the wings, and perished on the field.

RODEZ, or **Rhodes**, a city of S. France, capital of the department of Aveyron, situated upon a lofty promontory surrounded by the Aveyron, 310 m. S. of Paris; pop. in 1872, 11,662. It has an institution for deaf mutes, a normal school, lyceum, and diocesan seminary. It contains a fine Gothic cathedral begun in the 13th century, a monastery of the Cordeliers, handsome modern public buildings, manufactures of linen and serge, and a considerable trade in cheese, mules, and cattle.

RODGERS, **John**, an American naval officer, born in Harford co., Md., in 1771, died in Philadelphia, Aug. 4, 1838. He entered the navy as a lieutenant, March 9, 1798, and as executive officer of the frigate *Constellation*, Com. Truxtun, took possession of the French ship *L'Insurgente* captured by her off Nevis, Feb. 9, 1799. In March he was commissioned captain, and made a cruise in the Maryland, 20, upon the West India station. In June, 1803, in the *John Adams*, 28, in company with the *Enterprise*, 12, he successfully attacked a Tripolitan cruiser of 22 guns and several gunboats at anchor in a bay near Tripoli. In 1804 he commanded the frigate *Congress*, 38, in the squadron employed against Tripoli under Com. Barron, whom in 1805 he succeeded in command.

He afterward conducted successful negotiations with Tripoli and Tunis. In the spring of 1811, while lying off Annapolis in his flag ship, the *President*, 44, Capt. Ludlow, Com. Rodgers, received intelligence that a seaman had been impressed from an American brig off Sandy Hook by an English frigate. He sailed for that point without delay, and on May 16, when a few leagues to the southward of New York, discovered a vessel of war and gave chase to her, and a short engagement ensued. He ceased fire when his antagonist proved to be the weaker ship, and boarding her the next morning found that she was H. B. M. ship *Little Belt*, of 22 guns, Capt. Bingham. She had suffered severely, but declined receiving assistance, and the ships parted. The accounts of this affair given by the two commanders differed materially, particularly as to the firing of the first gun, and it widened the breach which already existed between the two nations. On June 21, 1812, on the declaration of war by the United States against Great Britain, Com. Rodgers sailed from New York in command of a squadron consisting of the *President*, the *United States*, 44, *Congress*, 38, *Hornet*, 18, and *Argus*, 16; and on June 23 a British frigate was discovered, to which a general chase was given. The *President* came at 4 P. M. within gun-shot of the English ship, when a running fight took place, in the course of which a gun of the *President* burst, killing and wounding 16, Com. Rodgers being among the wounded; and the enemy's ship escaped. It was afterward found that she was the *Belvidera*, 36, Capt. Byron, which had 7 killed and wounded, Capt. Byron among the latter. The loss of the *President* was 22 killed and wounded. Com. Rodgers extended this cruise for about 70 days, capturing seven British merchantmen. He subsequently captured the British packet *Swallow*, with a large amount of specie, and the schooner *Highflier*. In June, 1814, he was appointed to the new frigate *Guerriere*, and rendered important services in the defence of Baltimore. At his death he was senior officer of the navy.

RÖDIGER, **Emil**, a German orientalist, born at Sangerhausen, Thuringia, Oct. 13, 1801, died in Berlin, June 15, 1874. He studied theology in Halle, and taught there for many years, becoming in 1835 professor of oriental languages. In 1860 he was called to Berlin, where he remained until his death. His publications include *Syrische Chrestomathie* (1838), *Himjaritische Schriftmonumente* (1841), and the continuation of Gesenius's *Thesaurus Lingue Hebraicæ* (1853). After the death of Gesenius Rödiger edited his Hebrew grammar, from the 13th to the 21st edition (1874).

RODNEY. **I. Caesar**, a signer of the Declaration of Independence, born in Dover, Del., about 1730, died there in 1784. His grandfather, William Rodney, came from Bristol to Kent co., Del., soon after Penn became proprietary. Caesar inherited a large estate. He was sheriff of Kent co. in 1758, and soon after

became a member of the provincial assembly, in which he served till 1774, being speaker in 1769 and thereafter. In 1765 he was sent to the stamp act congress at New York. In the colonial assembly he earnestly advocated a bill forbidding the importation of slaves, which failed by only two votes. The colonies entering into correspondence upon the subject of their common defence, he became chairman of the committee of safety for Delaware; and in 1774, meetings of the people having been held at New Castle and Dover to demand the assembling of a convention, he issued a call as speaker of the assembly, convoking the representatives of the people at New Castle on Aug. 1. He was made chairman of the convention, and was elected a delegate to the continental congress, in which he was a member of the general committee to draw up a recital of the rights and grievances of the colonies. In March, 1775, he was again elected to congress. In May he was made colonel, and soon afterward brigadier general of the Delaware militia. In 1776 he was alternately in his seat in congress, and at work in Delaware stimulating the patriots and repressing the loyalists. In response to a special message, he rode with all speed to Philadelphia, just in time to give Delaware's vote for the declaration. After his retirement from congress he went to Trenton, where Gen. Stirling made him post commandant, and then to Morristown, whence by Washington's permission he returned home in February, 1777. He suppressed an insurrection in Sussex, and when in August the British advanced into Delaware, he took the field with what militia he could raise, and annoyed the flank of the enemy as they faced the American position on Red Clay creek. In September he was made major general of militia, and in December he was again elected to congress, but did not take his seat. A few days later he was elected president or executive officer of the state, which post he filled till January, 1782, when he declined reelection. He was then chosen to congress, and again in 1783, but did not take his seat. **II. Caesar Augustus**, an American statesman, nephew of the preceding, born in Dover, Del., Jan. 4, 1772, died in Buenos Ayres, June 10, 1824. He graduated at the university of Pennsylvania, and studied law. In 1802 he was elected to congress as a democrat, and was a member of the committee of ways and means, and one of the managers in the impeachment of Judge Chase. In 1807 he became attorney general of the United States, which place he resigned in 1811. During the war of 1812 he commanded an artillery company. In 1817 he was sent to South America by President Monroe as one of the commissioners to investigate and report upon the propriety of recognizing the independence of the Spanish-American republics, which he strongly advocated after his return. In 1820 he was again elected to the house of representatives, and in 1822 became a member of the United

States senate, being the first democrat who ever sat in that chamber from Delaware. In 1823 Monroe appointed him minister plenipotentiary to the United Provinces of La Plata. With J. Graham he published "Reports on the Present State of the United Provinces of South America" (8vo, London, 1819).

RODNEY, George Brydges, baron, an English admiral, born at Walton-upon-Thames, Surrey, Feb. 19, 1718, died in London, May 21, 1792. At the age of 12 he was taken from Harrow school and sent to sea; in 1739 he became a lieutenant, in 1742 a captain, and in 1748 went to the Newfoundland station as governor and commander-in-chief. In 1752 he returned to England and was elected to parliament, and in 1759 he was created rear admiral. In 1761 he was appointed commander-in-chief at Barbadoes and the Leeward islands, and reduced the islands of Martinique, Santa Lucia, and Grenada. In 1762 he was made vice admiral, in 1764 a baronet, in 1765 master of Greenwich hospital, and in 1768 was returned to parliament. He resigned his governorship of Greenwich hospital in 1771, on being appointed commander-in-chief at Jamaica. In 1774 he returned to England, but was obliged to seek refuge from his creditors in France. Finally he obtained money sufficient to pay his debts, and with the rank of admiral sailed in 1779 for the Barbadoes station, where he had been again appointed commander-in-chief. His squadron consisted of 22 ships of the line and 8 frigates, and after capturing several Spanish transports and ships of war, he fell in with a Spanish fleet off Cape St. Vincent in January, 1780, under Don Juan de Langara. This consisted of 11 ships of the line and 2 frigates, and of these 7 were taken or destroyed. On April 17, 1780, he came up with the French fleet near Martinique, but was prevented from capturing any of their vessels by the refusal of his captains to follow. He however broke through the enemy's lines with a portion of his squadron, and was rewarded with the thanks of both houses of parliament and a pension of £2,000. The same year he was elected to the house of commons from Westminster, and made a K. B. In December, 1780, he made an unsuccessful attack upon St. Vincent. War breaking out between Great Britain and Holland, he took the Dutch island of St. Eustatius without firing a shot, and then Demerara, Essequibo, and Berbice. In the autumn of 1781 he returned home, and was created vice admiral of England, and assigned the command of the West Indies. Returning thither, he went in pursuit of the French fleet under the count de Grasse. A partial action took place on April 9, 1782, and a general engagement on April 12. The battle began at 7 o'clock in the morning, and lasted till 6½ in the evening, and the British took seven ships of the line, including the French flag ship, and two frigates. The whigs meanwhile had come into office, and as Rodney was opposed to that party, an officer was sent to supersede

him; when, however, the news of his victory reached England, an express was sent to bring back his successor, but failed to reach him. Rodney arrived in England, Sept. 21, 1782, and received the thanks of both houses of parliament, with an additional pension of £2,000, and was raised to the peerage as Baron Rodney of Rodney Stoke in Somersetshire.—See "Life and Correspondence of Lord Rodney," by his son-in-law, Gen. Godfrey Basil Mundy (2 vols. 8vo, London, 1830).

RODRIGUEZ, Alfonso, a Spanish religious author, born in Valladolid in 1526, died in Seville, Feb. 21, 1616. He received his degree of doctor of philosophy at the university of Salamanca in 1545, and soon afterward entered the society of Jesus. After teaching for several years at Salamanca, he was appointed rector of the college of Monterey and professor of moral theology, which post he held for 12 years, his fame as a teacher bringing him pupils from every part of the country. He was afterward master of novices at Valladolid and Montilla for 30 years. His "Practice of Christian Perfection" (4to, Seville, 1640) has been translated into all the European languages.

RODRIGUEZ, Island of. See MAURITIUS.

ROE, Azel Stevens, an American novelist, born in the city of New York in 1798. After serving as clerk in a mercantile house in New York, he engaged in business as a wine merchant, and finally retired and settled at Windsor, Conn. His works include "James Montjoy, or I've been Thinking" (New York, 1850); "To Love and to be Loved" (1852); "Time and Tide, or Strive and Win" (1852); "A Long Look Ahead" (1855); "The Star and the Cloud" (1856); "True to the Last" (1859); "How Could He Help it?" (1860); "Looking Around" (1865); "Woman our Angel" (1866); "Cloud in the Heart" (1869); and "Resolution, or the Soul of Power" (1871).

ROE, Edward Payson. See supplement.

ROEBLING, John Augustus, an American engineer, born in Muhlhausen, Prussia, June 12, 1806, died in Brooklyn, N. Y., July 22, 1869. He was educated at the polytechnic school in Berlin, and emigrated to America and settled near Pittsburgh in 1831. He was assistant engineer on the slack-water navigation of the Beaver, and on the Sandy and Beaver canal and a feeder of the Pennsylvania canal, after which he spent three years in surveying the route across the Alleghenies adopted by the Pennsylvania Central railroad. He introduced the manufacture of wire ropes, first at Pittsburgh, afterward removing his establishment to Trenton, N. J., and their use in the construction of suspension bridges, his first work being the suspended aqueduct of the Pennsylvania canal across the Alleghany river, completed in May, 1845. He afterward constructed the Monongahela suspension bridge at Pittsburgh, and some suspension aqueducts on the Delaware and Hudson canal. In 1851

work was begun upon the Niagara bridge (see BRIDGE, vol. iii., p. 274), and in 1867 he completed the Cincinnati suspension bridge, which has a clear span of 1,057 ft. His last design was for the East river bridge, connecting the cities of New York and Brooklyn. (See BRIDGE.) Mr. Roebling published "Long and Short Span Bridges" (New York, 1869).

ROEBUCK, a small European deer of the genus *capreolus* (H. Smith), the *O. caprea* of Gray, and the *chevreuil* of the French. The horns are small, nearly erect, cylindrical, slightly branched, with a very short peduncle and three short branches; the skull has a very small, shallow suborbital pit; the muzzle broad and naked; tear bag indistinct; hoofs narrow and triangular, and a tuft of hair rather above the middle of the metatarsus. The color in summer is reddish brown, in winter olive with paler shades; inside of the ears fulvous, and a black spot at the angles of the mouth; the tail



Roe buck (*Capreolus caprea*).

is short, and the anal disk is large and white; the hair in winter is thick and harsh, and in summer thinner and more flexible. It is about 4 ft. long, 2½ ft. high at the shoulder and 2½ ft. behind. It is one of the most graceful and active of the deer family, frequenting the woods and copes of the rocky regions of Europe from the Scottish highlands to the Tyrol, but in less wild districts than the stag. Its agility and speed are astonishing, 20 ft. being sometimes cleared at a single bound. They are not polygamous, and a pair generally has two young at a birth, which are treated with the utmost tenderness by both parents, and often remain attached to each other after quitting the old ones; they congregate in small families, but not in herds, feeding on herbage and the buds and tender shoots of trees, from the latter habit often doing much mischief in a forest. The flesh is considered better than that of the stag, when the animal is properly killed. The horns are used for knife handles, &c.; they are

dropped after the breeding season in November, and are reproduced during the winter. The period of gestation is five months. From their strong scent they are easily hunted, though they frequently escape by their speed, doublings, springing to cover, and other artifices to baffle the hounds. In northern Asia is found the alu or Tartarian roebuck (*C. pygargus*, Sundev.); this is larger, with longer and more prickly horns, and coarser and longer hair; the color is brownish above and yellowish below; there is no tail. The roebucks are represented in North America by the Virginia deer (*cariacus*, Gray), and in South America by the brockets (*coassus*, Gray).

ROEBUCK, John Arthur, an English politician, born at Madras in December, 1802. From 1815 to 1824 he resided in Canada, and in 1832 he was admitted as a barrister in London. In the same year he was elected to parliament for Bath, and he soon became prominent as a radical reformer. In 1835 he was appointed agent for the assembly of Lower Canada during the contest between that house and the executive. He soon after published a series of political pamphlets, which involved him in a bloodless duel with the editor of the "Morning Chronicle," Nov. 19, 1835. In 1837 he lost his seat in parliament in consequence of his attack upon the whigs, but was reelected in 1841. In 1847 he was defeated again, and in 1849 was elected for Sheffield, which he represented till 1869. In the election of February, 1874, he was again returned as a liberal from Sheffield. On Jan. 29, 1855, the passage of his motion to inquire into the state of the army in the Crimea caused the resignation of the Aberdeen ministry; and he was chairman of the committee subsequently appointed for that purpose, and also of the short-lived "Administrative Reform Association," organized in 1856. He is the author of "Plan for the Government of our English Colonies" (1849), and of a "History of the Whig Ministry of 1830" (2 vols. 8vo, 1852).

ROERMOND (Fr. *Ruremonde*), a town of the Netherlands, in the province of Limburg, at the junction of the Maas and Roer, 27 m. N. N. E. of Maestricht; pop. about 9,000. It is the seat of a bishop, and contains a handsome cathedral of the middle ages and a parochial church with fine works of art. Its manufactures include woollens, cotton, and paper, and a considerable trade is carried on. The town has been frequently taken in various wars.

ROESKILDE. See RÖSKILDE.

ROGATION DAYS (Lat. *rogare*, to ask), in the Roman Catholic ecclesiastical calendar, the three days immediately preceding Ascension day, when public litanies or supplications are made for a blessing on the fruits of the earth. The custom of assembling in public to recite litanies or solemn supplications existed in the primitive church; but Mamertus, bishop of Vienne (died about 474), was chiefly instrumental in fixing for this purpose the three days before Ascension, and in giving them

an unusual degree of solemnity. They were thenceforward called *litanie majores*, the great litanies, were accompanied with solemn processions, and were held throughout the Latin church. A remnant of this custom in the cities and towns of England consists in the parochial clergy's visiting some part of the parish boundaries accompanied by the church wardens and people.

ROGER I., count of Sicily, 12th son of Tancred de Hauteville, born in Normandy in 1031, died in Mileto, Calabria, early in the summer of 1101. In 1058 he undertook, in conjunction with his brother Robert Guiscard, the conquest of Calabria, and afterward that of Sicily. In 1060 he took Messina, and in 1061 defeated the Saracens at Enna with great slaughter. A disagreement between Roger and Robert, owing to the refusal of the latter to divide the country, was settled in 1071 by the acknowledgment of Roger as count of Sicily; but it was not till 1072 that he came into possession of the island, by the conquest of Catania and Palermo. In 1085 he succeeded Robert as chief of the Normans in Italy. In 1090 he subdued Malta. He established Christianity throughout Sicily in 1096, but allowed his Saracen subjects liberty of conscience. In 1098 Urban II. made him apostolic legate.

ROGER II., first king of Sicily, son of the preceding, born in Mileto, Calabria, about 1095, died Feb. 26, 1154. He succeeded his father under the guardianship of his mother, Adelaide of Montferrat. On assuming the government, Roger reduced the barons to obedience, and brought Malta back to allegiance. In 1121 he took from his cousin William, duke of Apulia and Calabria, part of his possessions, and on his death in 1127 seized all his dominions in southern Italy. In 1130 he sustained his brother-in-law Anacletus as antipope, received from him the title of king of Sicily, and was crowned at Palermo the same year; and he established Anacletus in Rome, driving out Innocent II. In 1137 he was defeated by the German emperor Lothaire II., who had been called in by his revolted vassals; but he at once recovered his ground on the emperor's departure. Innocent II. falling into his power in 1139, Roger compelled him to remove his excommunication and to confirm his kingly title, in return recognizing his right to the papacy. He took Naples from Duke Sergius, and Capua and Aversa from Prince Robert. In consequence of insults from the Greek emperor Manuel Comnenus in 1146, he ravaged Epirus and Dalmatia, captured Corfu, and devastated Greece, bringing back an immense booty. In 1147 he attacked the empire of the Zoraides in Africa, and extended his sway over a large part of the Barbary coast. He introduced the sugar cane and the manufacture of silk into Sicily.

ROGER, Gustave Hippolyte, a French singer, born near Paris, Aug. 27, 1815. He studied at the conservatory, and was engaged as a tenor at the opéra comique from 1838 to 1846,

after which he accompanied Jenny Lind to London. Subsequently he appeared in grand operas, but not as successfully as on the comic stage. In Berlin he won favor in *Les Huguenots* and in *La dame blanche*, in Munich in *La Juive*, and in Hamburg in *Le prophète*, when he sang in German. He was again at the grand opera in Paris from 1855 to 1859, when he lost an arm while hunting. He subsequently appeared with an artificial arm, but never recovered his popularity. In 1868 he became professor of singing at the conservatory.

ROGERS, Charles. See p. 887.

ROGERS, Henry, an English author, born about 1810. He studied at Highbury college, and for some years was pastor of an Independent church. In 1839 he became professor of the English language and literature in University college, London, and was afterward professor of philosophy in Spring Hill Independent college, Birmingham, till 1858, when he became president of the Lancashire Independent college, Manchester. He has published "Life and Character of John Howe, M. A., with an Analysis of his Writings" (1836); a "General Introduction to a Course of Lectures on English Grammar and Composition" (1838); "Essays selected from Contributions to the 'Edinburgh Review'" (4 vols. 8vo, Edinburgh, 1850-'74); "The Eclipse of Faith" (1853); "Selections from the Correspondence of R. E. H. Grayson" (2 vols., 1857); "Vindication of Bishop Colenso" (1863); "Reason and Faith" (1866); and "Essays" reprinted from "Good Words" (1869 and 1874).

ROGERS, I. James Blythe, an American chemist, born in Philadelphia, Feb. 22, 1803, died there, June 15, 1852. He received the degree of M. D. at the university of Maryland, and was successively professor of chemistry in Washington medical college, Baltimore, the medical college at Cincinnati, the Franklin medical school of Philadelphia, and the university of Pennsylvania. For several years he was chemical and geological assistant in the surveys of Virginia and Pennsylvania. He published papers in the scientific journals, and was one of the editors of the last American reprint of Turner's "Chemistry." **II. William Barton**, an American physicist, brother of the preceding, born in Philadelphia in 1805. He first lectured on science in the Maryland institute in 1827, and in 1829 succeeded his father, Dr. P. K. Rogers, in the chair of natural philosophy and chemistry in William and Mary college. From 1835 to 1853 he was professor of natural philosophy and geology in the university of Virginia. In 1853 he removed to Boston, where he has since resided. He examined the region of the mineral springs of Virginia, and analyzed their waters; and in 1835 he organized the state geological survey, at the head of which he remained till it was discontinued in 1842. In 1862 he delivered a course of lectures before the Lowell institute on the application of science to the arts; and from 1862 to 1868 he

was president of the Boston institute of technology. He is the author of a treatise on the "Strength of Materials" (1838), "Elements of Mechanical Philosophy" (1852), and numerous scientific papers. In 1875 he was elected president of the "American Association for the Advancement of Science" for the ensuing year. **III. Henry Darwin**, an American geologist, brother of the preceding, born in Philadelphia in 1809, died in Glasgow, Scotland, May 28, 1866. He became professor of physical sciences in Dickinson college, Carlisle, in 1831, and afterward professor of geology in the university of Pennsylvania, which office he held for many years. He made a geological survey of the state of New Jersey, of which he published a report and map in 1835, and a final report in 1840. From 1836 to 1855 he was engaged in the survey of Pennsylvania, publishing during the first years annual reports of progress. His final report, in two large vols. 4to, with numerous drawings and illustrations, and an atlas (Edinburgh, 1858), is especially valuable in the departments of structural and dynamic geology. In 1857 he was appointed regius professor of geology and natural history in the university of Glasgow, Scotland. He contributed many important papers to the transactions of philosophical societies, and was one of the editors of the Edinburgh "New Philosophical Journal." He published a geological map of the United States and a chart of the arctic regions in the "Physical Atlas," and in conjunction with W. and A. K. Johnston of Edinburgh a geographical atlas of the United States. **IV. Robert Empie**, an American chemist, brother of the preceding, born in Baltimore in 1814. He took the degree of M. D. at the university of Pennsylvania, and in 1844 was appointed to the chair of chemistry in the university of Virginia, which he held till 1852, when he succeeded his brother Prof. J. B. Rogers as professor of chemistry in the university of Pennsylvania. He was associated with the latter in preparing the amended edition of Turner's "Chemistry," and has since edited the American reprint of Lehmann's "Physiological Chemistry." He has been for many years dean of the medical faculty of the university of Pennsylvania.

ROGERS, John, an English clergyman, born about 1500, burned at Smithfield, Feb. 4, 1555. He was educated at Cambridge, entered into holy orders there, and was chaplain to the English factory at Antwerp for several years. There he became acquainted with Tyndale and Coverdale, and from the manuscripts of the former, the published version of the latter, and his own researches, he compiled a complete edition of the Bible in English. The elaborate marginal notes and index are entirely his work. It was published in folio in 1537 under the assumed name of Thomas Matthew. From Antwerp he went to Wittenberg, where he was pastor of a Dutch congregation. On the accession of Edward VI. Bishop Ridley invited him

home, and made him prebendary and divinity reader of St. Paul's. On the Sunday after the triumphal entry of Queen Mary into London, in August, 1553, Rogers preached a sermon at St. Paul's cross, in which he exhorted the people to adhere to the doctrine taught in King Edward's days, and to resist the forms and dogmas of Catholicism. He was summoned before the privy council for this, but defended himself ably, and was released. On Aug. 18, however, he was ordered to remain a prisoner in his own house, and at the end of six months was removed to Newgate. He was tried in January, 1555, before Gardiner, bishop of Winchester, and condemned to be burned. He was the author of several theological works.

ROGERS, John, an American sculptor, born in Salem, Mass., Oct. 30, 1829. He was for two years a merchant's clerk in Boston, and after a voyage to Spain for his health entered in 1848 a machine shop in Manchester, N. H., where he remained seven years. In 1856 he took charge of a railroad machine shop in Hannibal, Mo., in 1857 visited Paris and Rome, and then became a draughtsman in Chicago. He there modelled a group called "The Checker Players," and another called "The Slave Auction," exhibited in New York in 1860. Opening a studio in New York, he became famous for small groups illustrating the civil war and common life, executed in a brownish gray composition. Among the best known of these groups are: "The Picket Guard" (1861); "The Returned Volunteer," "The Wounded Scout," and "Union Refugees" (1864); "Taking the Oath," "The Charity Patient," and "Uncle Ned's School" (1866); "The Council of War" and "Courtship in Sleepy Hollow" (1868); "The Fugitive's Story" (1869); "Coming to the Parson" (1870); a series illustrating the story of Rip Van Winkle (1871); and "The Favored Scholar" (1872). He has more recently modelled some larger statues for garden and lawn decoration, executed in artificial stone, and has also made some anatomical studies of the horse, for the use of art students.

ROGERS, Randolph, an American sculptor, born in the state of New York about 1825. In early manhood he spent several years in Rome studying his art. On his return home he soon became known through his statue of "Nydia, the Blind Girl of Pompeii," his "Boy and Dog," and other compositions. Returning to Rome, where he now resides (1875), he executed a statue of John Adams, now in Mt. Auburn cemetery. In 1858 he designed and modelled the bronze door for the capitol at Washington. The work, which is 17 ft. high and 9 ft. wide, is divided into eight panels, each of which represents in alto relievo a scene in the life of Columbus. Between the panels and on the sides are 16 statuettes of the eminent contemporaries of Columbus. After this he was employed for several years in finishing the designs for the Washington monument at Richmond,

begun by Crawford. Since the civil war he has designed and executed large memorial monuments for the states of Rhode Island and Michigan. The former, which was erected in Providence in 1871, is 50 ft. high; the crowning statue, "America," is 10 ft. high; and on the angles of the pedestal are statues 7 ft. high representing the four branches of the service. The latter, erected in Detroit in 1873, is similar in design, but larger and more elaborate; it is surmounted by a statue representing Michigan. Among Rogers's other works are a colossal bronze statue of Lincoln, unveiled in Philadelphia in 1871, a statue for the Colt monument in Hartford entitled "The Angel of the Resurrection," and ideal statues of "Ruth" and "Isaac."

ROGERS, Samuel, an English poet, born at Newington Green, near London, July 30, 1763, died in London, Dec. 18, 1855. He was educated by private tutors, and entered his father's banking house in his boyhood. In his 18th year he became a prose contributor to the "Gentleman's Magazine," and in 1786 published "An Ode to Superstition, with some other Poems," of which during the next four years only about 20 copies were sold. In 1792 he produced his "Pleasures of Memory," which at once gave him a place among the poets of England. His father at his death in 1793 left him an ample fortune, and he soon after retired from active participation in business, though retaining his interest as a partner. In 1798 appeared his "Epistle to a Friend, and other Poems;" and in 1803 he established himself in a house (No. 22) in St. James's place, which during the next half century enjoyed a wide celebrity as a resort of literary men and the receptacle of choice treasures of art. Rogers's "breakfasts," given in a shady apartment, became in time famous as a sort of social rallying point. His collection of pictures, books, vases, &c., was distinguished by its exquisite taste, and realized after his death upward of £50,000, a sum considerably larger than the original cost. His "Voyage of Columbus" was first published in a new edition of his poems in 1812, and in 1813 his "Jacqueline" appeared in a volume with Byron's "Lara." In 1819 he published a didactic poem entitled "Human Life," and in 1822 "Italy," a collection of pieces in blank verse and in prose. The remainder of his literary life was devoted to the publication of illustrated editions of his "Italy" and his "Poems," the designs for which were furnished by Prout, Turner, and Stothard, and were engraved by the first artists in England. He is said to have expended between £10,000 and £15,000 in this undertaking. On the death of Wordsworth he was offered the laureateship, which, in consideration of his great age, he declined. He retained his physical vigor until near the close of his life. His chief personal blemish was a tendency to ill-natured satire and unreasonable antipathies. Of this and other traits some

idea may be obtained from the volumes of his "Table Talk" published by the Rev. Alexander Dyce (1856), and a similar collection by his nephew William Sharpe (1859).

ROGET, Peter Mark, an English author, born in London in 1779, died there, Sept. 13, 1869. He graduated in medicine at the university of Edinburgh in 1798, and after a tour to the continent settled in 1804 in Manchester, where he was appointed physician to the infirmary, lunatic asylum, and fever hospital. In 1808 he went to London, and was for many years secretary of the royal society, and one of the Fulmerian lecturers on physiology at the royal institution. His best known work is the "Thesaurus of English Words and Phrases" (1852; 9th ed., revised, 1860; American ed. by Barnas Sears, D. D., New York, 1854). He also wrote "Animal and Vegetable Physiology," a Bridge-water treatise (2 vols. 8vo, 1834; 3d ed., 1840), "Electricity, Galvanism, Magnetism, and Electro-magnetism" (1848), &c.

ROHAN, Louis René Édouard, prince de, a French cardinal, born Sept. 25, 1734, died at Ettenheim, Baden, Feb. 17, 1803. He was destined for the church, and became while very young the associate of his uncle the bishop of Strasburg. In 1772 he was ambassador from Louis XV. to Vienna, was recalled in 1774 on account of his giving offence to the empress Maria Theresa by scandalous luxury and political meddling, and appointed after his return to various places of distinction and emolument. In 1778 he was made a cardinal, and in 1779 bishop of Strasburg. He was imprisoned in 1785 for his part in the affair of the diamond necklace, which so gravely compromised Marie Antoinette (see LAMOTTE-VALOIS), and was released in 1786, but dismissed from court utterly disgraced. In 1789 he was a deputy of the clergy of Hagenau to the states general; but being accused of disloyal conduct, he resigned his seat, and retired to his estate on the Rhine beyond the jurisdiction of France. In 1801, in consequence of the concordat, he resigned the bishopric of Strasburg.

ROHILCUND, the country of the Rohillas, in British India, W. of Oude, N. and E. of the Ganges, and S. of Kumaon and Gurhwal, now comprised in a commissionership or administrative division of the Northwest Provinces bearing the same name, and in the native principality of Rampoor, which is surrounded by the six districts composing the division. These districts are Bareilly, Bijnoor, Budaon, Moradabad, Shahjehanpoor, and Terai (Kashi-poor); total area, about 11,500 sq. m.; pop. in 1872, 5,435,550. The country is drained by several tributaries of the Ganges, of which the Ramganga is the largest. Sugar, cotton, cotton cloth, and timber are the principal articles of exportation. A good deal of rice is raised in the Terai region, which is irrigated by a large number of small canals and hill dams.—The Rohillas, from whom this territory derives its name, are descendants of the Afghan sol-

diery who established themselves in the vicinity of Delhi, and on the dissolution of the Mogul empire in the middle of the 18th century became independent. About 1770 they were attacked by the Maharrattas, and sought assistance from the vizier of Oude, who afforded them but little aid, and subsequently demanded an enormous sum in payment for it. In 1774 British troops were sent against the Rohillas by Warren Hastings, to enforce this demand, and the country was brought under subjection to the vizier, who in 1801 ceded to the English the entire territory with the exception of Rampoor. In 1857 the sepoys mutinied at every station in Rohilcund, and the country was a prominent seat of military operations.

ROHLFS, Gerhard, a German traveller, born at Vegesack, near Bremen, April 14, 1834. He studied medicine at Heidelberg, Würzburg, and Göttingen, went to Algeria, enlisted in the foreign legion of the French army, served in the conquest of Kabylia, and attained the highest rank open to a foreigner. Having there learned the Arabic language and the mode of life of the inhabitants, in 1861 he went to Morocco, where in the character of a Moham-medan physician he acquired the friendship of the grand sherif, and under his protection travelled through the country, traversing the Morocco portion of the Sahara from W. to E., and exploring the whole course of the wady Draa. On this journey he was treacherously attacked by his guides, robbed, and left for dead in the desert, with a broken arm. In 1864 he travelled still further in Morocco, and crossed the Atlas mountains to the oasis of Tuat. His description and map of the country were the first ever made from personal observation and with scientific knowledge. After a short visit to Germany in 1865 he returned to Africa, and traversed the continent disguised as an Arab from Tripoli to Lagos, by way of Moorzook in Fezzan, Bilma, Kuka, the chief city of Bornoo, the river Benoowe, the Niger, and the Gomba country. The journey occupied altogether about two years, and obtained him the medal of the royal geographical society of London. Rohlf's detailed account of it is contained in the *Ergänzungsheft* No. 84 to Petermann's *Geographische Mittheilungen* (Gotha, 1872). At the close of 1867, by order of the king of Prussia, he joined the English expedition against Abyssinia. He returned to Tripoli in 1868, and in 1869 traversed the desert from Tripoli to Alexandria, visiting the oasis of Siwah, the ancient Ammonium. In 1873, with an expedition of 100 camels and 90 men, organized under the patronage of the khedive of Egypt, he explored the Libyan desert W. of the chain of oases which skirt the valley of the Nile, and discovered that the depression called the Bahr Bela-ma (river without water) marked on many maps of the desert does not exist. The progress of the expedition S. W. of the oasis of Dakhel was stopped by hills of loose sliding sand, which the camels were un-

able to traverse; and in lat. 25° 11' N., lon. 27° 40' E., the party turned back. In 1875 he visited the United States, and lectured on his travels. His most important publications are: *Reise durch Marokko* (2d ed., Bremen, 1869); *In Abessinien* (1869); *Von Tripolis nach Alexandria* (1871); *Mein erster Aufenthalt in Marokko* (1873); *Quer durch Afrika: Reise vom Mittelmeer nach dem Tschad-See und zum Golf von Guinea* (Leipsic, 1874 et seq.); and *Drei Monate im libyschen Wüste* (Cassel, 1875 et seq.). Winwood Reade edited his "Adventures in Morocco and Journeys through the Oases of Draa and Taflet" (London, 1874).

ROKITANSKY, Karl, a German physician, born in Königgrätz, Bohemia, Feb. 19, 1804, died July 23, 1878. He studied medicine at Prague and at Vienna, where in 1828 he became assistant to the pathological and anatomical establishment. In 1834 he became extraordinary and in 1844 ordinary professor of pathological anatomy, in 1848 honorary rector of the university of Prague and member of the Vienna academy of sciences, in 1849 dean of the medical faculty, and in 1850 rector of the university of Vienna. He resigned his professorship in 1874. He was the projector of the great hospital of Vienna. He is considered in Germany as the highest authority in anatomy and pathology. His principal work is *Handbuch der pathologischen Anatomie* (3 vols., Vienna, 1842-'6; English translation by the Sydenham society, 4 vols., London, 1845-'52), entirely recast under the title of *Lehrbuch der pathologischen Anatomie* (3 vols., 1851-'61).

ROLAND, called by the Italians ORLANDO, a paladin of the court of Charlemagne, and one of the most famous heroes of the chivalric romances of the middle ages. According to tradition, he was a nephew of Charlemagne, and was slain at Roncevalles. The narrative of his defeat and death has been expanded into a history full of picturesque and marvellous details; and in the "Romance of Roncevalles," in the rhymed chronicle *La Spagna*, in the "Grand Chronicles," in Turpin's fabulous chronicle *De Vita Caroli Magni et Rolandi*, and later in the *Orlando innamorato* of Boiardo, the *Orlando furioso* of Ariosto, and the *Morgante Maggiore* of Pulci, he figures as the great exemplar of mediæval chivalry. The "Song of Roland," a metrical narrative of the hero's chief exploits, was a favorite with minstrels of the middle ages. His historical existence rests upon a doubtful passage in Eginhard's *Vita Caroli Magni*, and he is believed to be almost wholly the creation of fiction.—See *Das Rolandslied*, edited by Karl Bartsch (Leipsic, 1874), forming vol. iii. of *Sammlung der deutschen Dichtungen des Mittelalters*.

ROLAND DE LA PLATIÈRE, Jean Marie and Marie or Manon Jeanne, French revolutionists, whose histories are so interwoven that they can be best treated in a single article. M. Roland (born near Villefranche, Feb. 18, 1734, died by his own hand near Rouen in November,

1793) was destined for the church, at which he revolted, and at the age of 19, without resources, travelled on foot over the greater part of France. At Rouen he obtained employment with a relative, and finally received the appointment of inspector of manufactures at Amiens. He devoted his leisure to scientific studies, and was the author of several works on manufactures and rural economy in the series of *Arts et métiers* published by the academy of sciences (1779-'83). In 1776-'8 he travelled in Switzerland and Italy, and addressed to his brother, a prior in Paris, letters containing detailed accounts of manufactures and commerce in those countries, which were afterward published (6 vols. 12mo, 1782). On a visit to Paris in 1776, he had formed the acquaintance of Mlle. Manon Jeanne Philpon (born in Paris, March 17, 1754, executed Nov. 9, 1793). From early childhood she was a diligent reader of such books as fell in her way, among them the "Confessions" of St. Augustine and Plutarch's "Lives." At 11 years of age she obtained permission to spend a year in a convent preparatory to her first communion, and there formed an intimacy with a Mlle. Sophie Canet, with whom after their separation she kept up a correspondence for eight years (published in 1841 in 2 vols. 8vo). She was married to M. Roland in 1780, and in 1784 they visited England, and studied together the workings of its political system. After their return Roland was transferred in his official capacity to Lyons, and there finished his principal work, the *Dictionnaire des manufactures et des arts qui en dépendent*, forming part of the *Encyclopédie méthodique* (3 vols., Paris, 1785). His wife shared in all his labors. They both hailed the revolution with enthusiasm. Roland became a municipal officer of Lyons, and his wife contributed to a new democratic journal. In 1791 they removed to Paris, Roland having been chosen commissioner to the national assembly on behalf of the workmen of Lyons. Mme. Roland's saloon in Paris became the rallying point of the Girondist leaders, to whom her husband attached himself. On March 23, 1792, he became minister of the interior under Dumouriez. It is said that his most important state papers were drawn up by his wife, though she declares that she exercised little influence upon his acts. Louis XVI. having refused his signature to the decrees for the banishment of the priests and for the formation of a camp of 20,000 men, Roland addressed to him a letter written by his wife, warning him that his tenure of the throne depended upon his compliance with the popular will. No answer being returned, Roland read the letter in full council to the king, who by the advice of Dumouriez dismissed him and his two Girondist colleagues. Roland at once read the letter to the assembly, and it was ordered to be printed and distributed to all the 83 departments. The storm thus raised broke forth in the insurrec-

tion of June 20, and paved the way for that of Aug. 10, when the Girondists were restored to the ministry. Danton, who was made minister of justice, incited the Jacobins and the populace against Roland, and scandalous reports were spread about his wife. On Dec. 7 Mme. Roland appeared before the convention to answer a charge of treasonable correspondence with the English ministry. The triumphant manner in which she cleared herself at once silenced and enraged her accusers. During the trial of the king, Roland found important documents bearing against him in a secret closet of the palace, and submitted them to the convention; but as he had examined them without witnesses, it was charged that he had abstracted some of them. The Girondist ministers resigned Jan. 22, 1793, and on May 31 Roland was arrested and held a prisoner in his own house. Mme. Roland rose from a sick bed to demand his release at the bar of the convention; but she failed to get a hearing, and on her return found that he had escaped. She was herself arrested on June 2, and during her imprisonment wrote her memoirs under the title of *Appel à la postérité*, the manuscript of which was preserved by her friend Bosc, who also adopted her daughter and only child, then 12 years old. Her conduct was heroic, and on the way to the scaffold she occupied herself in comforting a despondent old man beside her in the cart. Of her *Œuvres complètes* (3 vols. 8vo, 1800) the first two volumes contain her *Mémoires* (new editions by C. A. Dauban, 4 vols., 1864, and by Prosper Faugère, 2 vols., 1864). Besides her correspondence with the demoiselles Canet, there have been published *Lettres autographes de Mme. Roland, adressées à Bancal des Issarts*, with an introduction by Sainte-Beuve (8vo, 1835). On Nov. 15, 1793, a week after her execution, the body of M. Roland was found four leagues from Rouen (in which city he had lain concealed for five months), pierced with the blade of a sword cane which lay beside him, and with a paper in his pocket protesting his honesty of purpose in all his actions, and concluding: "When I heard that my wife had been massacred, I would not remain any longer in a world stained with crimes." The corpse was carried to Paris and subjected to gross indignities.—See Dauban's *Étude sur Mme. Roland et son temps* (1864).

ROLETTE, a N. E. county of Dakota, bordering on British America, recently formed, and not included in the census of 1870; area, about 1,850 sq. m. The extreme E. part is watered by a stream that empties into Minnawakan or Devil's lake. The N. W. part is occupied by the Turtle mountains. The surface consists chiefly of rolling prairies.

ROLFE, Robert Monsey. See CRANWORTH.

ROLLIN, Charles, a French historian, born in Paris, Jan. 30, 1661, died there, Sept. 14, 1741. He was gratuitously admitted to a school the pupils of which attended classes at the collège

de Plessis. He next studied theology, but did not take orders, and became professor of rhetoric in his college, and in 1688 in the collège de France. He was chosen rector of the university in 1694, and was reelected in 1695. In 1696 he became coadjutor at the collège de Beauvais, where his methods of instruction subjected him on the part of the Jesuits to charges of Jansenism, especially as he had shown sympathy with the Port Royalists. He was dismissed from his rectorship in 1712, but held it again for a short time in 1720. Under Cardinal Fleury he was subjected to indignities on account of his enlightened opinions, and on his death public homage to his memory was prohibited by the government. His most popular work, *Histoire ancienne* (13 vols., 1730-'38), has been frequently reprinted in French and in English; the best known abridgment is by the abbé Tailhié (5 vols., 1853). His other works include *Traité des études* (4 vols., 1726-'38), also often reprinted in French and English, and *Histoire romaine* (9 vols., 1738 *et seq.*, the four last by his pupil Crevier; latest ed. by Didot in 10 vols., 1862; abridged by the abbé Tailhié, 5 vols., 1863).

ROLLIN, Ledru. See LEDRU-ROLLIN.

ROLLO. See NORTHMEN.

ROMAGNOSI, Gian Domenico, an Italian jurist, born near Piacenza in December, 1761, died in Milan, June 8, 1835. He was chief civil magistrate of Trent, and the Austrians arrested him in 1799 on account of his alleged sympathy with the French, but he was acquitted. During his detention he observed the deviation of the magnetic needle under the influence of a galvanic current. His discovery, published in a journal of Trent in 1802, attracted little attention until the discoveries of Oersted in 1819-'20. He was successively professor of law at Parma, Pavia, and Milan. After the fall of Napoleon he lost his position at the Milan university, but continued to lecture till 1817. In 1818 he was again tried for treason at Venice, and again acquitted. His most celebrated work is *Introduzione allo studio del diritto pubblico universale* (2 vols., Parma, 1805; 5th ed., Milan, 1836). Complete editions of his writings have been published at Florence (19 vols., 1832 *et seq.*) and Milan (15 vols., 1836-'45).

ROMAIC. See GREECE, LANGUAGE AND LITERATURE OF, vol. viii., pp. 208 and 210.

ROMANA, Pedro Caro y Sureda, marquis de la, a Spanish soldier, born in Palma, island of Majorca, in 1761, died in Cartaxo, Portugal, in 1811. He entered the naval service, and in 1782 participated in the siege of Gibraltar by the united forces of France and Spain. When the war broke out between these two powers, he joined the army. In 1800 he was appointed captain general of Catalonia, and then a member of the supreme council of war. When Napoleon forced the Spanish government to place an army at his disposal, these troops, 15,000 in number, were intrusted to

the command of La Romana, and sent in 1807 to Pomerania; but the general, hearing of the conduct of Napoleon toward both Charles IV. and Ferdinand, determined to leave at once the service of the conqueror. He communicated with the commander of the English fleet cruising at the entrance of the Baltic, and, availing himself of the troops being then in the island of Fünen, succeeded in embarking them on board some English men-of-war, Aug. 17-20, 1808, and landed them safely at Corunna. He was subsequently prominent in organizing the bands of guerillas which proved so terrible to the French. He left a diary, which was published with some of his letters in the supplementary collection of the French *Mémoires relatifs à la révolution française* (8vo, Paris, 1825).

ROMAN CATHOLIC CHURCH, the name popularly given to the body of Christians throughout the world in communion with the bishop of Rome. It is not assumed by the church herself. The holy Roman church is understood of the local church of Rome; but the term Roman is used, especially in French documents, as one of the characteristics of the church, which is styled Catholic, Apostolic, and Roman, because the see of Rome is its centre. In the congress of Vienna Cardinal Consalvi objected to the joint use of the terms "Roman Catholic," but was willing that they should be separately applied to the church, which is Roman by reason of its necessary dependence on the see of Rome, and Catholic on account of its universal diffusion. It is not confined to those of the Latin rite, but includes all of every rite who acknowledge the bishop of Rome as their head under Christ. Nearly 200,000,000 are estimated to belong to it. About 183 archbishops, 693 bishops, and 122 vicars apostolic compose the hierarchy.—The chief doctrines of the church regard the unity of the divine nature in three distinct divine persons, and the incarnation of the second divine person through the mysterious operation of the Holy Spirit in the Virgin Mary, and his death on the cross for the expiation of the sins of mankind. The belief of the incarnation is the ground and motive of the high veneration which is entertained for the Virgin, who is styled Mother of God, because Christ her son is God incarnate. To her is ascribed all sanctity and perfection which can be bestowed on a mere creature, and she is held to have been free from all stain of sin by a special privilege granted her that she might be worthy of the dignity for which she was divinely chosen. The mystery of the redemption is prominent in the teaching and worship of the church. Christ suffered and died, as man, to atone for the sin of our first parents, and the sins of all mankind. As all humanity fell in the first Adam, so in him, the second Adam, all humanity is restored. His death fully expiated the guilt of sin, and presented an atonement in every respect perfect. Yet all men are not

justified and saved, but those only to whom the redemption is applied by means divinely prescribed. Baptism is believed to be chiefly a remedy for original sin, applicable even to infants. Adults having the use of reason must believe in Christ and repent of sin, in order to receive the benefit of the atonement. From those who have forfeited baptismal grace, fruits of penance are required as evidences of their sincere conversion to God, and as conditions to entitle them to the application of the merits of Christ. Nothing that man can do, unassisted by God's saving grace, can take away the guilt of sin, or prove an adequate satisfaction for it; but God requires the humiliation of the sinner, and accepts his penitential works, which derive value from the ransom offered by Christ. They add nothing to it, but they become acceptable through it. Christ is the essential Mediator, through whose blood we must sue for pardon and salvation.—The worship of the church is given to God only, the one eternal Being in the three divine persons, and the incarnate Word, God consubstantial to the Father. Inferior religious honor, which may be called worship in a qualified sense, is given to the Virgin Mary, on account of the gifts and graces with which God has endowed her, and her exalted dignity as Mother of God incarnate. The angels, that is, incorporeal spirits reigning with God, are honored as his creatures, in whom his perfections are reflected, and as his messengers, through whom he has manifested his will. Saints, those who have proved faithful in the divine service to the end, and are already crowned with glory in the kingdom of God, are venerated likewise for their triumphant virtue; the martyrs especially, who died amid torments rather than deny Christ, and the virgins, who throughout life preserved the purity of their affections, are deemed worthy of high honor. But there is an essential difference between the honor given to the creatures of God and that which belongs to God alone. He receives the submission of the understanding and the will, the homage of the affections. He is acknowledged to be the essential Being, the supreme Lord, the beginning and the end of all things. Sacrifice is given to him only, in token of his being the sole source of being and life. Prayer, in its strict acceptance, can be addressed to him only, the Giver of every good gift. Grace and salvation depend on his bounty and mercy. Litanies and prayers to the saints are only appeals to them to intercede with God for us through Jesus Christ. They are not supposed to be omniscient or omnipresent, but to know in God the pious desires as well as the penitential sighs of the faithful. Respect is paid to the crucifix, which recalls to our mind the sufferings of Christ for our redemption, but it does not terminate in the symbol or material object. The kissing of the image, the bending of the knee, the prostration of the body in the ceremonial of Good Friday, are all directed

to Christ the Redeemer. So the images of the saints awake the remembrance of their virtues. The bowing of the head to a statue, or the burning of incense before a shrine, is referred to the saint whose memory is honored for his love of God and his zeal for the divine glory. Relics, that is, objects used by the saints, or particles of their remains, are venerated for the relation they bear to them.—The fall of the first parents of the human race is the fundamental doctrine on which the belief of the mystery of redemption depends. They were created in innocence, and raised to a state beyond the powers of nature, being constituted just and holy by a communication of divine grace, and rendered capable of immortality. The prohibition to eat of a certain tree in the garden in which they were placed was intended to exercise their obedience, that their dependence on the Creator might be manifested. If they had been faithful, they would have transmitted to their descendants the supernatural gifts with which they had been endowed; but their disobedience involved the forfeiture of them for their posterity, as well as for themselves. Original sin is that transgression which is common to the whole human family, each one being estranged from God and liable to his wrath, in consequence of the act of the heads of the race. The natural powers have been weakened by the fall. The freedom of the human will remains, but it is less vigorous than in our first parents. Our nature is not vitiated and depraved, but it is prone to evil and exposed to violent temptation. It is despoiled of supernatural gifts, cast down from the exalted position to which it had been gratuitously raised, and deprived of the special providence destined to it in the beginning. A redeemer was given us, in the person of Christ, who, being God-man, atoned by his sufferings for the sin of our first parents, and merited for us all grace by which temptation may be overcome.—Actual sin is the wilful transgression of the divine law by individuals having the use of reason. It supposes advertence to the malice of the action and the consent of the will deliberately given, although the advertence and consent may not be full, since sins of ignorance occur. The omission to perform duties positively prescribed is also sinful. The design to do evil is criminal even as the act, and the wilful contemplation of forbidden acts may imply guilt on account of the danger of consenting to them. Mortal sin is any act, speech, desire, or thought grievously opposed to the natural or divine law. Sins which imply no direct or grievous opposition to the law of God are styled venial, because their pardon is easily obtained, since they do not separate the soul from God. Slight impatience, rash words, vain self-complacency, may be venial. Deliberate hatred, gross calumny, acts of violence, not to speak of drunkenness, lust, and murder, are mortal sins. The distinction of sins is not derived from the individual who commits them,

although they may be aggravated by his personal obligations. Forgiveness of sins, even the most heinous, is promised to the penitent. Sorrow for having committed them is a necessary disposition in order to obtain it. Perfect sorrow, which is called contrition, springs from divine love, and leads us to detest sin as opposed to the goodness of God and to his essential perfection. Attrition is sorrow of a less perfect kind, arising from an experience of the evil consequences of sin, and a dread of the punishments which await it hereafter. If it weans the heart from sin, and inspires an effectual detestation of it, so as to be accompanied with a firm resolution of amendment, it is held to be useful and salutary, and such as may dispose for pardon in the sacrament of penance. No degree of anguish of mind can insure our reconciliation with God so long as we are not firmly determined to shun sin and the occasions of relapse. The forgiveness of sin properly belongs to God, who is offended. Christ, as God-man, forgave sin, and authorized the apostles to impart forgiveness or withhold it. In virtue of this commission the power of forgiveness is exercised by bishops and priests, as delegates of Christ. The power is judicial, since they may bind or loose, retain or remit; on which account a confession of sin is required from every applicant for its exercise. When this is made with sincerity, humility, sorrow, a willingness to repair the wrong committed, and a determination to shun the occasions of sin, the priest absolves the penitent. This absolution is a judicial sentence, deriving its force from the divine institution.—The sacraments are rites instituted by Christ our Lord as instruments and means of grace, to apply to our souls the merits of his sufferings and death. They are said to contain and confer grace, technically *ex opere operato*, because they are effectual means divinely chosen to impart it, where no obstacle is presented by the receiver. Certain dispositions, however, are required on the part of adults who desire to partake of them. Faith and compunction are necessary on the part of the applicant for baptism. Sorrow with a firm purpose of amendment is likewise required from the professed penitent. The strengthening grace of the Holy Spirit is granted, by the laying on of hands with prayer, to the baptized believer whose heart is free from wilful sin. Sin is forgiven to the dying man who with penitence and hope receives the mystic unction, and for whom the prayer of faith is offered up. The imposition of hands is available for the communication of sacerdotal power, even to the unworthy candidate; but grace is given to him who is called by God, and who with humility corresponds to the divine vocation. Marriage is a great mystery, the image of the union of Christ and the church, to be celebrated with purity of affection. The eucharist, the chief sacrament, is to be approached with hearts cleansed from sin, under penalty of becoming

guilty of the body and blood of the Lord, and incurring condemnation.—The elevation of man to the rank of adopted child of God, and coheir with Christ to God's kingdom, the beatific vision and the eternal union through it with the Godhead, form a destiny transcending the conception and exigency of nature. All help vouchsafed of God to man toward the attainment of this destiny or end must needs be supernatural, like that end itself. This help is called grace. It is God's free gift, by which the mind is enlightened and the will is strengthened, is necessary to conceive a good thought, and still more to undertake or perform any work directed to salvation. This is proffered to all, but is actually dispensed according to a just yet incomprehensible disposition of Divine Providence, with wonderful variety. It does not interfere with the freedom of the human will, which it moves and aids, without imposing necessity. The grace which moves to prayer, if complied with, is usually followed by the grace of action, which enables us to perform our duty. What is beyond our actual strength becomes practically possible, if not easy, by means of the help thus afforded. To God properly belongs the glory of any good which we perform, because our sufficiency, our power, is from him; but to us the reward is promised, inasmuch as we might resist his impulse by abusing our freedom. It is not easy to reconcile the exercise of free will with the divine foresight. We cannot understand how it is possible for us to act independently, and of our own determination, when God from eternity has foreseen our action. It is sufficient for us to know and feel our freedom, without sounding the depths of divine knowledge: The church, having declared the necessity of grace for all supernatural acts, and for the beginning or first thought directed to such an end, has abstained from deciding the controversies of the schools regarding the modes of reconciling the freedom of the human will with such necessity, and with the divine foreknowledge. It suffices then to admit that without the grace of Christ we can do nothing, and to hold that we can do all things in him who strengthens us. The grace of God is not given to the elect alone, since Christ did not die for them only. God wishes all men to be saved, and grants graces remotely, if not proximately, sufficient for this end. The divine commandments are not impossible. If great difficulty be experienced in their fulfilment, even occasionally by just men, grace can be obtained by prayer by which it may be removed, so that what may appear impossible to nature may be rendered easy by grace.—Everlasting beatitude, consisting in the contemplation and enjoyment of God, is the reward promised by him on condition of the fulfilment of his commandments, and bestowed gratuitously on baptized infants or others incapable of personal acts. The punishment of grievous sin is eternal. All guilty of such, who die

unrepentant, are for ever separated from God, and suffer torments. Those who die guilty of slight faults, or debtors to divine justice, are withheld for a time from the enjoyment of heaven. The glory of heaven is immediately attained by baptized infants dying before the use of reason, by adults dying immediately after baptism, by martyrs, and by all who die with perfect love of God, and free from sin or debt of punishment. The soul only is admitted to happiness. The body is subject to dissolution, but is to be raised at the end of time, in order to be reunited to the soul and made partaker of its glory. The degrees of beatitude vary according to the greater or less love of God which distinguishes each of the elect, even as star differs from star in brightness. All the saints, however, will be perfectly happy, because free from all suffering or pain, from all passion or inordinate desire, and rejoicing in the fulfilment of the divine will. We are not called on to scrutinize the divine decrees with regard to election to glory. Its attainment supposes coöperation and fidelity to grace on the part of adults. It is imparted as a reward. God cannot predestine any to torments without reference to their demerits and offences, since punishment is to be inflicted only for transgression.—The teaching of Christ our Lord becomes known to us especially by the preaching of the ministry, tracing back their commission to his apostles. Solemn definitions of faith are the most authoritative forms of this preaching. They are declarations not merely of doctrines contained in the written word, but of revealed truths, whether written or unwritten. Christ himself left nothing in writing; several of his apostles wrote much, and two other sacred writers composed narratives of his life and teaching; but many things belong to the deposit of doctrine which were not explicitly placed on record. The body of bishops feel themselves authorized to propose as revealed truth whatever has come down from the beginning in the church, and been generally acknowledged to appertain to doctrine. In cases of difficulty, when doubts have been raised with regard to some tenet, they feel themselves competent to examine the evidence, and decide whether the doctrine has been revealed. After a definition, it is no longer allowed to question a truth sealed with their approval. Infallibility in judgment is claimed for the body of bishops in union with their head, the bishop of Rome. By it is meant the providential guidance of the Holy Spirit, by which they are directed and enlightened in doctrinal decisions, that they may not mistake error for truth, or propose as divinely revealed what lacks the seal of divine authority. The same infallibility which Christ promised to the church is claimed for the head of the church, when, in the performance of his office of teacher and pastor of the whole of Christ's flock, he defines *ex cathedra* a doctrine regarding faith or morals to be held by the universal church.

(See INFALLIBILITY.) These doctrinal definitions or judgments of the Roman pontiff are of themselves final, and irreformable even before the acquiescence of the episcopal body.—The divine Scriptures are acknowledged by the church as the word of inspiration, written under the impulse of the Spirit of God, and to be received with all faith and reverence. The books of the Old Testament contained in the Jewish canon are admitted, to which are added certain other books written before the coming of Christ, and known to the Jews, especially those of Alexandria, but not fully recognized as of binding authority. These are accepted by the church on ancient testimony, usage, and tradition derived from the apostles. The books of the New Testament contained in the canon include some of which doubt was entertained in the early ages. The canon of the council of Carthage held in 397, and that of Innocent I. and Gelasius in the following century, are followed in the list of sacred books adopted by the council of Trent. The church claims the supreme authority of determining the meaning of the Scriptures, in conformity with the general teaching of the fathers, that is, the ancient Christian writers.—Faith, according to the Roman Catholic view, is the assent of the human mind to divine truth proposed and attested by the church of God. The fact of revelation is essential, since no persuasion, however strong, can give to opinion the character of a revealed truth. It must be propounded by the church, in order to be regarded as a point of Catholic belief. Revelations made to an individual challenge the assent of his mind to the truth manifested to him; but an authoritative declaration by a divinely appointed teacher, the church, the pillar and ground of the truth, is necessary to afford certainty of the fact of revelation to men generally. The assent of the mind must be given to all revealed truth, for the authority of God is alike vouchsafed for all, and the testimony of the church extends to all. Faith is necessary to salvation, so that without it it is impossible to please God. The wanton and proud rejection of a single point of revealed doctrine involves the wreck of faith. Want of opportunity of instruction, insufficiency of evidence proposed, weakness of understanding, and unavoidable prepossessions arising from birth and education may extenuate or excuse the denial of some doctrine, not recognized as revealed. Hence invincible ignorance is admitted by divines in respect to many not actual professors of Catholic doctrine, although God only can determine with certainty the individuals for whom such plea may be available. The exclusive language of church formularies, which declare that without Catholic faith none can be saved, receives this mild interpretation. All baptized children are claimed by the church as her own, since baptism is the sacrament of regeneration, and they continue such until by their wilful profession of condemned error they

forfeit their birthright.—The natural law, as manifested by reason and declared in the decalogue, is the foundation of moral theology. The development of it in the New Testament guides theologians in their examination of duties and rights. The writings of the fathers illustrate many points. The decisions by popes and councils of matters submitted to their judgment are necessarily followed. Moral theology is the scientific discussion of all matters appertaining to conduct, and is consequently most comprehensive, since it embraces whatever has reference to vice or virtue, to the general principles of right, to the obligations of every station in life, and to the infinite variety of circumstances in which individuals may be placed. Much is necessarily left open for dispute in a science which comprises every imaginable case that may wear a moral aspect, on which account complaints are made of the latitude of theological opinions, favorable to relaxation of morals; but it is considered of no small importance that the great principles of morality should be broadly stated and steadily maintained. Confessors study casuistry, as physicians study maladies and infirmities, to understand human disorders, and apply the remedies.—The principles of the Catholic church with regard to civil duties are highly conservative. She is indifferent to forms of government and social institutions, and is content to exercise a salutary influence on society, by inculcating those maxims of right and order which are found in the gospel. She feels bound to respect established authority, and to enforce by moral suasion obedience to those in high station. The early apologists of Christianity confidently appealed to the persecutors themselves as witnesses of the loyalty and submission of the faithful. In the middle ages the church was occasionally in conflict with the civil power, because, being acknowledged by princes and peoples as the representative of God, she sought to restrain the passions of rulers, who called themselves her children, by the laws and maxims of Christ, and to regulate society by the divine law. In the present state of the world, divided into so many independent kingdoms and states, and into opposite sects, she confines her efforts for the moral control of nations to proclaiming the revealed doctrines, and teaching that religion is the only secure basis and strong bond of society.—By discipline Catholics understand all that appertains to the government of the church, the administration of the sacraments, and the observances and practices of religion. The essential worship consists in the sacrifice of the mass, which, although mystical and commemorative, is real and propitiatory, being a bloodless continuation of the bloody sacrifice of the cross. Vespers, that is, evening prayer, are solemnly sung, the psalms of David being employed in the divine praise, with the song of the Virgin Mary, and pious hymns, and prayers. Other portions of the divine office are sung in the cathedral churches of

Catholic countries at various hours each day, by clergymen called canons, devoted to this duty. Besides the Lord's day, or Sunday, which from the apostolic times has been set apart for divine worship, in place of the Jewish sabbath, festivals are celebrated to honor the divine mysteries, and present them to the devout contemplation of the faithful. Many are solemnized in honor of the Virgin Mary, the apostles, martyrs, confessors, virgins, and saints of every class, whose virtues are thus set before the faithful for their imitation. Fasting is also a part of church discipline. Forty days before Easter are devoted to this exercise, in commemoration of the fast of our Lord during that period. Ember days, namely, Wednesday, Friday, and Saturday, in each of the four seasons, are observed as fasts to obtain the divine blessing for the seasons, and worthy ministers for the church, ordinations being held at those times. The eve of great solemnities is observed by fasting, in order to prepare by penance for their celebration. Abstinence is observed on each Friday of the year, and in many countries on Saturday. All these penitential observances are matters of church law, which admits of dispensation. The rites of the mass, and the ceremonies used in the administration of the sacraments, appertain to discipline, which admits of variety and change, although great deference is shown for ancient usage. This serves to connect ancient and modern times, and to manifest harmony in faith and worship. For this reason the Latin liturgy, used from early times in the Roman church, is still employed by the celebrant, although instructions are given in the vernacular language, and facilities are afforded to the faithful for praying in a manner suited to their capacity. The chief points of practice on which changes have taken place in the course of ages are the manner of administering baptism and the eucharist, as also penitential discipline. The solemn mode of baptism was originally by immersion. The candidates used to descend into fountains or streams, or rivers, and sink beneath the waters under the pressure of the hands of the minister. In cases of necessity and danger, less solemn modes were used, which, from being frequent, at length after the lapse of ages became universal. In like manner the eucharist, having been instituted by our Lord under the forms of bread and wine, was generally administered under both kinds for many ages. Exceptional cases were always admitted, which at length proved so numerous as to supersede altogether the ancient usage. The church claims the right to regulate, at her just discretion, whatever regards the manner of administering the sacraments, while she holds their substance to be inviolable. Penance for sin was always enjoined, and was proportioned to the degree of the guilt. It became a regular system about the 3d century. In the East it received a great check in the time of Nectarius, the predecessor of St. Chrysostom, the office of

public penitentiary having been abolished at Constantinople in consequence of a scandal. In the West it was observed with more or less rigor for several ages, but was effectually set aside by the indulgences granted in the 12th and 13th centuries to volunteers in the wars called the crusades. The penitential canons ceased to be applied even in the tribunal of penance, and milder remedies were offered to those who were found unwilling to submit to the severe injunctions of the ancients. Penitential discipline is now almost exclusively confined to the sacrament. Indulgence, or the relaxation of penitential rigor in favor of fervent penitents, was granted by the bishops on certain conditions regulated by the penitential canons. After the change of discipline, indulgences assumed a new form. They were no longer necessary to release from the obligation of the ecclesiastical law, which had gone into desuetude, and were not directed to the forgiveness of sin, which needed the sacramental remedy; but they were offered to the penitents to aid them in satisfying divine justice, by applying to them the superabundant satisfaction of Christ and his saints. They served as incentives to works of piety, such as almsgiving, fasting, and prayer.—The organization of the church consists in its government by bishops, each in charge of a special flock, or portion of the faithful, with subordination one to another, and the dependence of all on the bishop of Rome, as shepherd of the whole fold of Christ. The episcopal character is the same in all bishops, but governing authority, which is called jurisdiction, is possessed in various degrees—in its fulness by the pope, who is the fountain, the streams of which flow to all others. He alone has apostolic authority, which may be everywhere exercised, with due regard to the local prelate, and which is suited to every emergency. During the vacancy of the Roman see, this plenitude of jurisdiction is believed to reside in the cardinals governing *ad interim*. Each bishop governs his own diocese, not as papal vicar, but as ordinary, that is, proper ruler, although in some things his authority is enlarged as delegate apostolic. Several dioceses form a province, which is governed by an archbishop, who however is not allowed to interfere with his suffragans unless when appealed to, or when a council over which he presides deems a visitation necessary. Many ecclesiastical provinces sometimes are united as a nation by means of a primate, who ranks above other prelates. The title of patriarch was given in the early church to the bishop of Alexandria, the see of St. Mark the disciple of Peter, and to the bishop of Antioch, which Peter had governed for some years. Jerusalem also received this title, and even Constantinople. At present there is scarcely a vestige of patriarchal power in these ancient churches, although the title is given to some bishops *in partibus infidelium*, but rather with a view to keeping up the remem-

brance of the authority than to its exercise. Even the patriarchal prerogative of the pope is swallowed up in his primacy, so that he seldom appears as patriarch of the West, choosing rather to rest on his supreme authority. The six senior cardinals derive their titles from suburbicarian churches. There are, besides Rome, nine patriarchal dignities, viz., Constantinople, Alexandria, Antioch (where there are four, for the Maronite, Melchite, Syrian, and Latin rites respectively), Jerusalem, Babylon (of the Chaldean rite), Cilicia (of the Armenian rite), the East Indies, Lisbon, and Venice. The episcopal sees in both hemispheres are technically distinguished as belonging either to the Latin rite or to the oriental rites. Of the former, some are immediately subject to the see of Rome in its patriarchal capacity, or because the titulars are bishops *in partibus infidelium*. This category comprises 10 archiepiscopal sees in Europe, Amalfi, Camerino, Catania, Cosenza, Ferrara, Gaëta, Lucca, Rossano, Spoleto, and Udine, and two in Asia, Babylon and Smyrna; and 81 episcopal sees, together with Ispahan in Persia, Port Louis in Africa, St. John (Newfoundland) and Harbor Grace in America, and Auckland, Dunedin, and Wellington in Oceania. Of sees not immediately subject to Rome, there are in Europe 84 metropolitan sees, the heads of so many ecclesiastical provinces, with 406 suffragan sees. In Asia, the Latin metropolitan sees of Goa and Smyrna have respectively four and two suffragans. In Africa, Algeria forms a separate province, with an archbishop at Algiers and suffragans at Constantine and Oran. The African sees of Angola, Angra, Funchal, Cape Verd, and St. Thomas (Guinea) are suffragan to Lisbon; the bishopric of the Canaries is suffragan to Seville, and that of Réunion to Bordeaux. The 30 ecclesiastical provinces of North and South America comprise 165 sees, of which 135 are suffragan. British America has 22 bishops with 5 metropolitans, and the United States have 56 dioceses, 10 metropolitan sees, and 6 vicariates apostolic. The episcopal sees of Guadeloupe and Martinique are suffragan to the archbishopric of Bordeaux. Oceania has two ecclesiastical provinces, that of Manila with 4 suffragans, and that of Sydney in Australia with 9. The churches belonging to the various oriental rites in communion with the Roman pontiff comprise 13 Græco-Ruthenian sees, of which 2 are in Russia, 1 in Prussia, and 10 in the Austro-Hungarian monarchy; one Græco-Roumanian metropolis, with 3 suffragan sees, also in the Austro-Hungarian monarchy; an Armenian metropolitan see at Leopoldstadt in Hungary; in Asia, the Armenian patriarchate of Cilicia, with the Armenian metropolitan sees of Aleppo, Casarea, Marash, Mardin, and Melitene (Malatiah), and 11 suffragan dioceses; the Græco-Melchite patriarchate of Antioch, with the archbishoprics of Aleppo, Damascus, Emesa (Homs), and Tyre, and 9 suffragan sees; the patriarchate

of the Syrian rite at Antioch, with metropolitans at Aleppo, Babylon, Damascus, and Mosul, and 8 suffragans in various cities, including Alexandria; the Syro-Chaldean church, with a patriarch at Babylon, 4 archbishops, and 7 bishops; and the Syro-Maronites, with a patriarch at Antioch, 5 archbishops, and 3 bishops, including one in Cyprus. The Egyptian as well as the Abyssinian Copts have no regular hierarchy, but depend respectively on vicars apostolic resident among them. The Bulgarian Greeks are also under the jurisdiction of a bishop consecrated in 1865, with the title of apostolic administrator. Of the Asiatic Catholics, the Melchites are the most energetic and devoted. Besides the above episcopal functionaries, there is a large class of bishops called vicars apostolic, who superintend the spiritual welfare of the Catholics wherever it is not found practicable to establish sees and a regular hierarchy. There are 2 vicariates in the German empire, 1 in Gibraltar, 3 in Scotland, 1 in Sweden, 21 in the Chinese empire, 14 in the adjacent kingdoms, 23 in India and Burmah, and others in Asia Minor, Abyssinia, the Galla country, Madagascar, and among the various tribes and settlements along the entire seaboard of Africa. In America there are vicariates apostolic in the valley of the Mackenzie, British Columbia, Lower California, the Antilles, British and Dutch Guiana, and in the territories and at various other points in the United States. Vicars apostolic also preside over the missionary labors of the chief island groups of Oceania. At other points in European and other countries, where the presence of a bishop is either undesirable or unnecessary, priests with special faculties, denominated prefects apostolic, minister to the wants of scattered Catholics. They are to be found in Iceland, Norway, Schleswig, and Switzerland, on the most dangerous Asiatic and African missions, &c. There is no dependence or connection between the members of the hierarchy in the various portions of the world, under different civil rulers, but all are linked together in unity by means of Rome, the common centre. The general government of the church is carried on at Rome, where the pope is assisted by the body of cardinals, several of whom compose standing committees to examine and prepare the matters for final action. Nearly 30 belong to the congregation of propaganda, which is charged with a general superintendence of missionary countries. The appointment of bishops is made on the recommendation of the local prelates, with the advice of the cardinals. In several monarchies the nomination is given to the sovereign, with a power of rejecting or confirming reserved to the pontiff.—The religious orders in the church are like corporations in a civil government, having special exemptions and privileges. They derive them from the pope, who, in virtue of his apostolical authority, exempts the members from the jurisdiction of the bishops in

what regards their domestic discipline, but leaves them dependent on them for faculties to be exercised in behalf of the faithful. Their privileges, however, are moderated and regulated in such a manner as not to weaken the diocesan authority, or favor insubordination, but only to encourage religious discipline and promote piety. The superior greatly lightens the burden of episcopal solicitude by training and watching over the members of the community, who themselves are rewarded for the restrictions to which they voluntarily subject themselves, by the security which is given them to pursue unmolested the path they have chosen. (See MONACHISM.)—The history of the church begins with the pastoral commission given after Christ's resurrection to the apostle Peter, who, according to Catholic ecclesiastical traditions, sealed his apostolic labors with martyrdom at Rome in the year 67, on the same day as the apostle Paul. This event attached his office to this see. Clement, bishop of Rome, wrote to the Corinthians, in the name of the church, at the close of this century, while St. John was still alive, remonstrating with them on a schism which had broken out among them. The labors of the several apostles are not known in full detail. The apostle Paul labored more than all others, and with marked success. St. James, who is called the brother of the Lord, presided as bishop at Jerusalem, and died a martyr. St. John passed the latter years of his life in Asia, and terminated his course at Ephesus. St. Mark, the evangelist, founded the church at Alexandria. At the close of the apostolic age the Christian religion was widely spread, chiefly throughout Asia Minor and some more distant provinces, Greece, the adjacent islands, Italy, and Egypt. Gaul is believed to have been partially evangelized in that age, and Spain is said to have been visited by the apostle Paul, who purposed making this journey, and, as the national tradition will have it, by St. James. In the early part of the 2d century the countries on the left bank of the Rhine, as far as Belgium, had received the gospel, as St. Irenæus testifies. This bishop succeeded St. Photinus, disciple of St. Polycarp, at Lyons in 178. Britain received missionaries under Eleutherius, bishop of Rome, about the same time. A council of 70 African bishops was held at Carthage toward the end of the century; and 90 bishops assembled in Numidia. The relations of the bishops generally to Rome, on account of its higher chieftaincy, are distinctly stated by Irenæus, who, however, earnestly remonstrated with Pope Victor on his determination to cut off various Asiatic churches from communion for their attachment to the usage of celebrating Easter on the same day as the Jews. In the middle of the 3d century a synod of Spanish bishops deposed Martial of Leon and Basilides of Astorga for criminal weakness in the persecution during the reign of Decius. The acts of various councils of

African bishops are known, especially from the writings of St. Cyprian, who warmly resisted the decree of Pope Stephen by which the repetition of baptism conferred by sectaries was forbidden. The controversy finally resulted in the following century in the acquiescence of the church generally in the decree, which was supported by the council of Nice. The 4th century, after some scenes of persecution, witnessed the triumph of Christianity by the conversion of the emperor Constantine. Although he decidedly favored it, and lent his power to its support, nevertheless he is believed not to have received baptism until the approach of death. By his mandate a council of bishops was called at Nice, where about 318 convened in the year 325, and proclaimed Christ to be God, consubstantial to the Father. Sylvester, the bishop of Rome, was prevented by old age from being present, but Hosius, bishop of Cordova, and two priests represented him. The Nicene symbol met with great opposition on the part of bishops who had received the doctrines of Arius, and were supported by Constantius, the successor of Constantine. A council of bishops at Rimini, under imperial influence and constraint, consented to suppress the term which proved so offensive, and the occasion of so much strife; but on recovering their liberty they retracted, and Pope Liberius annulled their acts by the authority of St. Peter. The 5th century was illustrious for the pontificate of St. Leo, whose prayers were believed to have turned away the wrath of Attila, advancing to destroy Rome. His exposition of the mystery of the incarnation crowned the efforts of his predecessors for the maintenance of the faith, and received the homage of the bishops assembled at Chalcedon. "This," they cried, "is the faith of the fathers. We all have this faith. Peter has spoken by the mouth of Leo." At Nice the fathers developed the meaning of the apostolic symbol by phrases and clauses necessary to meet the subtleties of innovators. At Constantinople a special statement was inserted in the creed to place the divinity of the Holy Spirit beyond dispute. At Ephesus the bishops inflicted excommunication on Nestorius, bishop of Constantinople, for obstinacy in resisting the authority of Pope Celestine, who condemned his errors. At Chalcedon the letter of St. Leo was adopted as the symbol of orthodoxy, and subscription to it was exacted, under the same penalty. Those councils served to define with precision the revealed mysteries, and were generally subsidiary to the papal action. The acts of those of Nice and Constantinople are not preserved in their integrity, but the extant records of those of Ephesus and Chalcedon show that the legates of the pontiff led the way, and the fathers followed his authority. At the close of the 6th century Gregory the Great, bishop of Rome, conceived the idea of evangelizing the Angles, or English, who had settled in Britain without adopting the Chris-

tian faith of its former inhabitants. The mission of the monk Augustin, at the head of a band of his brethren, proved eminently successful. A see was founded at Canterbury, and the church was fully organized with close dependence on the chair of Peter. The 7th century was marked by the general diffusion of the faith in England, and the more perfect organization of the English hierarchy. In the 8th century the Germans in great numbers were brought to the faith by the preaching of Boniface, called also Winifrid, an English missionary. He distinguished himself by his devoted attachment to the apostolic see, to which he made a solemn oath of duty. Various other missionaries, from Ireland especially, preached the faith about the same time with like success. It spread also toward the regions of the north, Denmark, Sweden, Norway, and Iceland. The scandals of the 10th century disfigured the church, since unworthy men struggled to occupy the papal chair, or to place in it their relatives and adherents. The influence of the emperors of the West had greatly declined, and some Italian nobles aspired to the pontificate. The intrusion of one or two youths and of several men of licentious habits disgraced the high office; but after a time men of wisdom and piety were once more at the helm. Hildebrand attained to the pontificate in 1073, under the name of Gregory VII. With all his zeal and the authority of his office, he condemned the marriage of the clergy, which from toleration had become not unfrequent. He resisted the emperor Henry IV., who disposed of bishoprics, abbaies, and other high offices, for corrupt considerations. The inveterate character of these abuses and the imperial influence involved the pontiff in a long and fierce struggle, in which he seemed to succumb, dying in exile, but in reality overcame, leaving his successors to reap the fruits of his labors. The contest between the popes and the emperors continued, with intervals of rest, throughout the 12th and 13th centuries. Investitures were in the beginning of this period the chief subject of disputes, the popes resisting the claims of the emperors to invest bishops with the temporalities of their sees, by delivering to them the ring and crosier, chief symbols of episcopal authority. The opportunity thus furnished for promoting unworthy men, courtiers, and favorites, determined the popes to vigorous resistance; and although Paschal II. yielded for a moment to imperial violence, on the recovery of his liberty he retracted his consent, and humbled himself for his weakness. Innocent IV., in the middle of the 13th century, in the council of Lyons deposed the emperor Frederick II. for various acts of simony, sacrilege, and tyranny, following out the principles and the example of Gregory VII., who was the first to proceed to a similar deposition. The 14th century is remarkable for the removal of the papal chair to Avignon by Clement V., who, in the dis-

tracted state of Rome, accepted the protection of the French king. His example was followed by his successors for nearly 70 years, popularly styled by the Romans the Babylonish captivity. These French popes were bishops of Rome, which they governed by cardinal vicars acting in their name. The restoration of the chair to that city was followed by a schism, formed by French cardinals, who elected Clement VII. in opposition to Urban VI., the pope residing at Rome. An attempt to terminate the rupture by setting aside both claimants resulted in the election of Alexander V. in the council of Pisa, and the three pretendants had their respective followers. At length, in the council of Constance, opened in 1414, Martin V. was chosen (1417) and acknowledged. The Greeks returned for a short time to the communion of the Roman see in the council of Florence held in 1439, but were drawn back by the persevering efforts of Mark, bishop of Ephesus, who resisted every influence employed by his colleagues and by the Greek emperor at the council. Constantinople a few years afterward fell under the power of the Turks, and the degradation alike of the eastern church and empire was consummated. Some popes of doubtful fame appeared in the decline of the 15th century, and one of acknowledged depravity at its close. The warlike career of Julius II. and the golden age of Leo X. were not calculated to restore the high character for austerity and zeal which the pontiffs had generally borne. The bold monk of Wittenberg appeared on occasion of the indulgences which Leo offered to contributors to the grand fabric of St. Peter's. The rivalry of two religious orders added fuel to theological disputes, which on the part of Luther were marked by great boldness. He soon became a leader, and before he was fully aware he was the head of a sect inculcating principles subversive of the papal authority, and more successful than its predecessors in the 13th and 15th centuries, the sects of Albigenses and Husites. A number of minor sects soon appeared, and a vast portion of the Catholic world, perhaps fully a third, was drawn away from obedience to the Roman see. Henry VIII., king of England, from a champion of the faith, became an enemy when his desires for a divorce were thwarted by Clement VII. The progress of the reformation was soon arrested by the zeal of many devoted men, founders of various religious institutes, especially by the followers of Ignatius Loyola, whose labors caused a considerable reaction in favor of the church of Rome. These labors proved more effective than the more violent intervention of Charles V., Philip II., or the inquisition. The saintly Pius V., the stern Sixtus V., and others of less marked character, performed well the duties of their office. The religious wars of the 16th and 17th centuries ended with the triumph of Catholicism in France and a partial victory of Protestantism in the Netherlands and Germany.

The subtleties of Jansenius, bishop of Ypres, annoyed the church in the 17th and 18th centuries, his followers, after his example, employing the authority of Augustine to countenance doctrines decidedly Calvinistic. The French church especially was harassed by these doctrinal disputes. They prevailed throughout the early part of the 18th century, and prepared the way for the triumph of infidelity in the revolution. In the present century there is a manifest reaction. The church of France, after much persecution, is intimately united with the see of Peter. In the German empire since 1870 a serious conflict has arisen with the civil power; but now (1875) a compromise seems likely to be made. (See GERMAN; also ITALY, SPAIN, and SWITZERLAND.)

ROMANCE LANGUAGES, also called *Romantic languages*, tongues developed from Latin through admixture of Germanic, Celtic, and other idioms. They are Provençal, French, Spanish, Portuguese, Italian, Wallachian or Rouman, and perhaps also Romansh. These languages are not direct descendants of the classic Latin, for when the Germanic races settled in the Romance countries Latin was spoken only by the clergy, and in the 6th century Boëthius and Cassiodorus were the only lay writers who still made use of it. Though Latin proper ceased to be a living tongue about the beginning of the 6th century, the *lingua rustica*, or vulgar Latin, the speech of the populace of the Italian peninsula, continued to be spoken both at home and in the Latinized countries, and came to be designated as the *lingua Romana* or Roman language. (See ITALIC RACES AND LANGUAGES, and LATIN LANGUAGE AND LITERATURE.) Raynouard has attempted to show that this *lingua Romana* was the same as the Provençal of southern France, and that French, Italian, and the other Romance languages were its daughters, and not its sisters. This theory was at once assailed and has since been refuted, with different lines of research and argument, by French as well as English and German scholars.—See Sir G. Cornwall Lewis's "Essay on the Origin and Formation of the Romance Languages" (2d ed., London, 1862); Max Müller's "Lectures on the Science of Language" (1st series, London, 1861); and the separate articles on the languages in this Cyclopædia.

ROMANIA. See ROUMELIA.

ROMAN LAW. See CIVIL LAW.

ROMANO, Giulio. See GIULIO ROMANO.

ROMANOFF. See RUSSIA.

ROMANS, Epistle to the, one of the canonical books of the New Testament. The epistle was written by the apostle Paul, according to the opinion of most critics, in A. D. 58, during his abode at Corinth, where he stayed about three months after making a journey through Macedonia and Achaia. Paul despatched the letter by a Cenchrean woman who was traveling to Rome, and sent greetings from an inhabitant of Corinth. Many modern commenta-

tors suppose that the debates mentioned in ch. xiv. and xv. called forth the epistle. Its special bearings are particularly manifest in ch. xiii. to xvi., in which Paul shows to both Jews and gentiles the glory of Christianity as being the only true religion, and especially endeavors to confirm the faith of the converts from Judaism.—As to its contents, the epistle consists of two chief divisions, one of which is argumentative, the other hortatory. In the former, the apostle, after an introduction (i. 1-16) expressing his desire to see the saints at Rome, sets forth the gospel plan of salvation. The gospel is a power unto salvation to every one who believes, both Jew and gentile; it is needed by all, for none, not even the Jew by his law, are justified before God (i. 16 to iii. 20). It is only faith in Christ which works justification, even as Abraham and David were justified by faith (iii. 21 to iv. 25). Those who are justified have peace with God, and rejoice; for through Christ, the reconciler, a new life has begun for mankind (ch. v.). But with reconciliation holiness must be connected, not under law, but under grace (vi., vii.). The spirit of life in Christ overcomes sin and the flesh, and all earthly sufferings, through hope; the believer lives already here below in security (viii.). The apostle then deprecates the rejection of Jews, but finds some consolation in the assurance that it will not be final (ix. to xi.). In the second or hortatory part the apostle enjoins various duties (xii.), in particular duties to magistrates (xiii.). He urges mutual forbearance (xiv.), and especially admonishes the strong to bear with the weak (xv.), and concludes with various salutations and directions (xvi.).—The authenticity of the epistle has rarely been impugned, though Bruno Baur has denied the genuineness of the last two chapters, and Semler, David Schultz, Weisse, and Ewald have maintained that ch. xvi. did not originally form a part of the epistle. Weisse and Ewald consider it a fragment of an epistle addressed to the Ephesians. Renan has supposed that the epistle was written originally as a circular letter, four copies being made with different endings, and sent to the churches in Rome, Ephesus, and Thessalonica, and to some church not known. Lightfoot maintains that it was first written to Rome, but afterward altered by Paul in the address and salutations, and sent out generally.—The literature on this epistle is very copious, and is detailed in De Wette's *Einleitung in das Neue Testament* (8th ed., Berlin, 1869), and in the American edition of Lange's commentary. It is treated in the general commentaries of Estius and Cornelius a Lapide, written from the Roman Catholic standpoint, and of Calvin, Bengel, Olshausen, De Wette, Meyer, Alford, Wordsworth, and Ewald; and in special works by Reiche (Göttingen, 1833-'4), Hodge (Philadelphia, 1835; enlarged ed., 1864), Fritzsche (Leipsic, 1836-'43), Rückert (2d ed., 1839), Turner (New York, 1853), Tholuck (5th ed., Halle, 1855),

Van Hengel (Bois-le-Duc, 1855), Umbreit (Gotha, 1856), Brown (Edinburgh and New York, 1857), Stuart (6th ed., Andover, 1857), Jowett (2d ed., London, 1859), Vaughan (2d ed., 1861), Mangold (Marburg, 1866), Forbes (Edinburgh, 1868), Hofmann (Nördlingen, 1868), and Paulus (Zürich, 1875).

ROMANS, King of the. The coronation of Otho I. of Germany by Pope John XII. at Rome in 962 was considered as having transferred the imperial dignity bestowed by Leo III. on Charlemagne (800) from his Italian to his German successors, the title of emperor depending, however, on the coronation at Rome. Before that coronation the German monarchs, down to the time of Maximilian I., styled themselves kings of Germany (though by historians indiscriminately designated as emperors), and improperly also kings of the Romans. In a stricter sense the latter title belonged to the princes elected in the lifetime of crowned emperors to succeed them; Henry VI. was thus elected king of the Romans, or future emperor, in the lifetime of his father Frederick Barbarossa (1169). Maximilian I. and his successors assumed the imperial title, and were crowned as emperors in Germany without being crowned in Rome, Charles V. alone being crowned by the pope. Their successors elect continued to be called kings of the Romans down to Joseph II., who was elected in the lifetime of his father Francis I. (1764), and the empire continued to be called the holy Roman empire down to its dissolution in 1806.

ROMANSH, or Rومانsh, also called Romanese and Rhaeto-Romanic, a language spoken in the Grisons, Switzerland, and the bordering districts of Tyrol, comprising a portion of ancient Rhaetia. Though it is commonly grouped with the Romance languages, its peculiar construction and the great degree in which it has been subjected to foreign influences, as well as the arbitrariness with which it has always been written, have so obscured its original character as to render it very doubtful whether it has ever been a direct sister of Provençal, French, or Italian. The Germans call the language Churwälsch after the name Churewala anciently given to its territory. The term Rhaeto-Romanic is a modern invention, never used by the people speaking the language. The natives call it *rumonsch*, the Provençals *romans*. It has been maintained that the Rhaetians were of the same origin with the Etruscans, but this view cannot be said to be established. (See ETRURIA.) In the time of Augustus Rhaetia was conquered by the Romans, and the original language was in a measure displaced by Latin. Several centuries later the western portion was occupied by Alemanni and the eastern by Boioarians, which brought about a greater confusion in the Latin elements, and produced a preponderance of Germanic forms. Two main dialects are now distinguished, Romansh proper and Latin, each of which has several varia-

tions. There are about 70,000 persons who still speak it, about 15,000 of them living in Tyrol. The earliest monument of the language is a version of the New Testament, published in 1560; and the various poetical and theological works, all of a minor character, since produced, number about 180 volumes by 150 authors. The language is now gradually succumbing to German.—See Andeer, *Ueber Ursprung und Geschichte der rhaeto-romanischen Sprache* (Coire, 1862), and Rausch, *Geschichte der Literatur des rhaeto-romanischen Volkes* (Berlin, 1870).

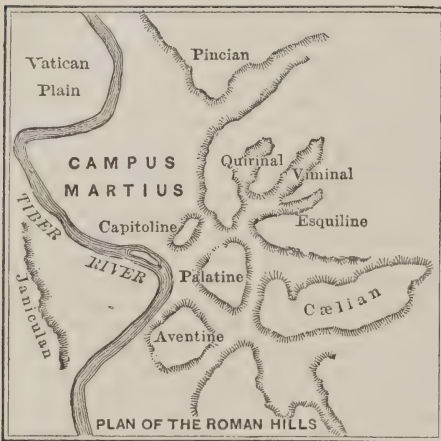
ROME, a city and one of the county seats of Oneida co., New York, on the W. bank of the Mohawk river (which here changes from a S. to a S. E. course), at the junction of the Erie and Black River canals, and at the intersection of the New York Central, the Rome, Watertown, and Ogdensburg, and the Rome and Clinton railroads, 15 m. W. N. W. of Utica and 110 m. by rail W. N. W. of Albany; pop. in 1870, 11,000; in 1875, 12,511. It is laid out with wide streets, well shaded with maples and elms. Public and private parks and fountains add to its beauty, and pure water is obtained from the Mohawk. The city contains 200 wholesale and retail stores, three banks, two savings institutions, two rolling and puddling mills, a knitting mill, sash, blind, and planing mills, locomotive and car works, and minor manufacturing establishments. There are ten schools, a free academy, and an institution for the education of deaf mutes, two weekly newspapers, and 15 churches.—Fort Stanwix, of revolutionary fame, was in what is now the heart of Rome, and the battle of Oriskany was fought just outside of its limits. The fort was besieged by the British in July and August, 1777. Rome was incorporated as a village in 1819, and as a city in 1870.

ROME, a city and the county seat of Floyd co., Georgia, at the confluence of the Etowah and Oostenaulla rivers, which here form the Coosa, 60 m. N. W. of Atlanta; pop. in 1870, 2,748, of whom 1,005 were colored; in 1875, including the suburban villages of South Rome, Forrestville, and De Soto, about 6,000. The Selma, Rome, and Dalton railroad passes through it, and it is connected by the Rome railroad (20 m. long) with the Western and Atlantic railroad at Kingston. The Oostenaulla is navigable by steamers 70 m. above this point, and the Coosa 180 m. below, to Greenport, Ala. Rome is situated on several picturesque hills, which command an extensive view of mountain scenery. It has the finest water works in the south. It is in the centre of the rich iron ore deposits of N. W. Georgia, and is the nearest town to six blast furnaces now in operation. It contains a rolling mill, a nail factory, and two iron foundries and machine shops. There are three private banks, two female colleges, two male high schools, seven primary schools, two newspapers (one daily and weekly and one tri-weekly

and weekly), and eight churches.—Rome was incorporated in 1847. It was occupied by the forces of Gen. Sherman, May 19, 1864, during the advance on Atlanta.

ROME (Lat. and It. *Roma*), the chief city of ancient Italy, ultimately the capital of the Roman empire, and now the capital of the kingdom of Italy. Its origin is lost in the mists of antiquity, for modern criticism has dispelled nearly all belief in the legends which for many centuries passed as historic testimony respecting the primitive city. There are grounds for the supposition that small fortified towns or villages stood on each of the seven hills now comprised within the walls of Rome. On the Palatine hill there were probably two such fortresses in prehistoric times, one Etruscan, the other either Pelasgic or Sabine. The more fully developed city and state seems to have risen from a union of the inhabitants on the Palatine with the Etruscans, Sabines, and Pelasgians, and perhaps also with other peoples,

What is known as the fall of the Tarquins was probably the overthrow of the Etruscan power. The population of Rome then consisted of the patricians and their clients, and of plebeians. The patricians were the original Roman people, and were divided into three tribes, the Ramnenses, the Titienses, and the Luceres, who represented the Latin, the Sabine, and the Etruscan elements of that population. The clients were the dependants of the patricians. The plebeians, or commons, were freemen, but had originally no political rights. They owed their existence to conquest and other causes, and they were mostly of Latin origin. By the Servian constitution they were incorporated into the state. This change was long regarded as the subversion of a popular constitution, by the substitution of an aristocratical polity; but Servius, or whoever it was by whom the change was made, did really, by establishing the constitution of the centuries, and constituting the order of equites, a distinct political body, of mixed patrician and plebeian elements, break up the patrician monopoly of power, and prepare the way for those further political reforms by the success of which Rome became mistress of the ancient world. The change was liberal, and opposition to its facts and its principles was never permanently successful. That regal Rome was powerful, and possessed an extensive territory and a large population, is established by the greatness of its public works, some of which endure to this day; and also by the terms of the treaty between Rome and Carthage, which, made in the first year of the republic, shows that the whole Latin coast was subject to Rome. The republican polity is supposed to have been established about the year 510 B. C. The most ancient history of Rome of which we have any knowledge was written in Greek by Fabius Pictor, a Roman citizen who served in the Gallic war, 225 B. C. No fragment of it remains. We know only by vague report of a similar work in Greek by Timæus, a Sicilian, who brought his history down to about 261. The earliest history of Rome in Latin is by Cato the Censor, who died in 149. The Servian constitution, as a whole, was lost as one of the effects of the overthrow of the monarchy; but it was gradually restored in part, its principles characterizing all the subsequent struggles of the plebeians to obtain power in the republic. Early republican Rome was a weak state, and for a century and a half it exercised little influence at home, and none abroad. Not only the kings fell, but the country fell with them. Rome is believed by modern historians to have been conquered by Porsena, and when she recovered her freedom, she was no longer the head of Latium; and during the next 150 years she was employed in recovering the ground she had lost. This slow advance was owing to internal convulsions. The political contests between the patricians and the plebeians were bitter, and



Plan of the Roman Hills.

long previously settled on the adjacent hills. (See *ITALIC RACES AND LANGUAGES*.) This union seems to have reached a state of political and constitutional perfection about 51½ centuries B. C., in the reign of that monarch who is known as Servius Tullius, and toward the close of the regal period. During that period a Roman state had grown up (according to the legends, ruled successively by Romulus, the reputed founder about 753 B. C., Numa Pompilius, Tullus Hostilius, Ancus Martius, Tarquin the Elder, Servius Tullius, and Tarquin the Proud), which seems to have been a powerful monarchy, and which may have been, as Müller thinks it was, in the times of the Tarquins and Servius, ruled by an Etruscan dynasty, by whom Etruscan usages were introduced into Rome. Its mythology resembled that of the Greeks. (See *MYTHOLOGY*, vol. xii., p. 118.) This monarchy embraced a portion of southern Etruria and the whole of Latium.



Rome and its Vicinity, Ancient and Modern.

more than once they threatened the utter destruction of the state. The plebeians seceded from Rome about 494, with the intent to found a new city; but a compromise was effected, and plebeian tribunes were created, for the purpose of protecting members of their order against the cruel and unjust action of patrician magistrates; during their year of office, the persons of these tribunes were to be sacred and inviolable. The number of tribunes was increased, until they became ten; and they possessed the veto power, which enabled them to stop any law, or to annul any decree of the senate, without assigning any cause for their action. They were the representatives and protectors of the plebeians, and none but plebeians could be made tribunes. The plebeians were at the same time allowed to elect two ædiles. By the Publilian law it was provided that these tribunes and ædiles should be chosen by the tribes in the forum, and not

at the assembly of the centuries in the Campus Martius. The first free election was held about 470. Spurius Cassius, who was finally put to death by the patricians because he had successfully advocated a popular agrarian law, formed leagues with the Latins and Hernici, by which the Volsci and Æqui were prevented from conquering Rome and Latium. The legends of the elder Brutus, Lucretia, Valerius Publicola, Horatius Cocles, Mucius Scaevola, Menenius Agrippa, Coriolanus, the dictator Cincinnatus, and the Fabii belong to this first period of the republic. Historically, Cincinnatus appears as a stern oligarch. The decemvirate was established in 451 (according to the commonly adopted chronology), and lasted but two years, the period of its existence being a patrician despotism, to which belongs the legend of Virginia. The consuls elected in 449 (according to some the first, the supreme magistrates of the republic having previously been

called *prætors*) were L. Valerius Potitus and M. Horatius Barbatus. Several popular laws were passed under their lead, by which an appeal to the people was secured to every citizen, the people including the plebeians, and the assembly of the tribes was endowed with full legislative power. The Canuleian law provided that patricians and plebeians might intermarry. A proposition to throw the consulship open to the plebeians led to the establishment of military tribunes, to which offices plebeians were eligible. The censors were now first appointed. The *quæstorship* was thrown open to the commons in 421, and this opened the senate to them. Veii was conquered in the beginning of the 4th century B. C. by Camillus. About 390 Rome was taken by the Gauls under Brennus, after a battle on the banks of the Allia, and destroyed, with the exception of the citadel on the Capitoline hill, which was bravely defended through a siege of seven months. According to one account, the dictator Furius Camillus defeated Brennus and totally destroyed his army; but the better sustained tradition is that the Gaul quitted Rome as a conqueror, after receiving 1,000 lbs. of gold as a ransom for the defenders of the fortress. The people then wished to settle at Veii, but their design was prevented through the influence of Camillus. They were reduced to great misery, and to this time belongs the story of Manlius Capitolinus, who, like earlier popular leaders, was charged by the patricians with aspiring to kingly power and put to death. The Licinian rogations were brought forward in 376, by the tribunes C. Licinius Stolo and L. Sextius; they provided that debtors should be relieved, that the occupation and use of the public domain should be limited, and that one of the consuls should be a plebeian. After a contest of about ten years, these rogations became law; and during the contest a law was passed committing the charge of the sibylline books equally to plebeians with patricians, an invasion of the monopoly of the religious ministry of the state which the latter had long held. L. Sextius was the first plebeian consul, chosen at the election next following the triumph of the measures of himself and his colleague. At this time the judicial power was taken from the consuls, and placed in the hands of the *prætor urbanus*, a newly created patrician magistrate. The *curule ædileship* was created, to which members of both orders were eligible. These changes were the most important events of Roman history. Not only did they go far to unite the two orders, and so put an end to those civil contests which had prevented the military advance of the Romans, but by enlarging the sphere and elevating the spirit of citizenship, they created the citizen legions by whom the conquest of Italy was effected. But for this, the Samnites would probably have become masters of the Italian peninsula. The patricians did not immediately submit to the Licinian laws, both con-

sulships being at times held by members of their order down to 343; but after that time they were divided regularly. In 172 both consulships were opened to the plebeians. The first plebeian dictator was C. Marcius Rutilus (356), who was chosen censor five years afterward. For many years after the restoration of Rome under Camillus, the wars waged by the Romans were carried on against Volscians, Æquians, Etruscans, and Gauls, and were successful contests, the victors behaving with much liberality to those of the vanquished whom they incorporated into the state, making them citizens, and increasing the number of the tribes. Fears of the Gauls led to the renewal of the Latin league in 358. The first Samnite war began in 343, and the immediate occasion of it was the demand for assistance by the Capuans against the Samnites, they surrendering their city to Rome. It lasted little more than a year, when peace was made in consequence of the renewal of internal troubles; and the settlement of those troubles was followed by the Latin war, which ended (339) in the complete triumph of the Romans. The second Samnite war was begun in 326, and lasted about 22 years. Its fortunes were various, including the disaster of the Caudine forks, but the Romans were finally victorious. The Etruscans made war upon Rome, but were defeated. The third Samnite war opened in 298, and Samnium submitted to Rome in 290. The Gauls and Etruscans were also defeated in the same war. During the time of these wars several political measures were carried at Rome which tended to establish equality between the plebeians and patricians; and by the Ogulnian law the pontificate and the augurate were opened to the plebeians. The passage of this law, in 300, is considered as the establishment of the Roman constitution. "What is called the constitution of Rome," says Arnold, "as far as regards the relations of patricians and plebeians to each other, was in fact perfected by the Ogulnian law, and remained for centuries without undergoing any material change. By that law the commons were placed on a level with the patricians, and the contests between these two orders were brought to an end for ever. The *comitia* too had assumed that form, whatever it was, which they retained to the end of the commonwealth; the powers of the magistrate as affecting the liberty of the citizen underwent but little subsequent alteration." The subsequent civil troubles were social, or were brought about by the ambition of able men who sought to make use of "the forum populace," a class entirely distinct from the plebeians, with whom they are often confounded; or they were caused by attempts to effect great reforms, like those of the Gracchi, which sought the restoration of the old constitution after its provisions had long been neglected or violated by the ruling classes. The last secession of the plebeians took place in 286, and

was appeased by the enactment of the Hortensian laws, which reduced debt, divided lands among the needy, and provided that all the resolutions of the tribes should be law for the entire people. This last measure clothed the people with supreme legislative power, and took from the senate its veto on their action. The dictator Hortensius put an end to that dispute in which the people had been supported by Curius Dentatus, one of the most popular Roman characters, both with his contemporaries and in history. He had previously conquered the Sabines of the mountains. The extension of their dominion to the south now brought the Romans into collision with the Italian Greeks, at the same time that they were defeating the Gauls in northern Italy. They aided the Thurians, who were of Greek origin, against the Lucanians and others, who were believed to be incited by the people of Tarentum, one of the most opulent and powerful of the Hellenic communities. A Roman army was marched to Tarentum, and the Tarentines called Pyrrhus, king of Epirus, to their aid. This was at the close of the year 281. Pyrrhus landed in Italy with more than 20,000 men, and defeated the Romans at Heraclea, and afterward at Asculum. He was not well supported by the Italians; and in consequence of an alliance between Rome and Carthage, he made peace with the Romans, who had an excellent consul in Fabricius, and went to Sicily, where he pursued a brilliant but unsuccessful career till 276, when he returned to Italy, where he was defeated in the following year by Curius Dentatus, near Beneventum. The Romans now pursued their course of Italian conquest, and about 264 they had become masters of all ancient Italy. In that year the first Punic war broke out. The Romans resolved to assist a body of mercenaries, called Mamertines, who had possession of Messana in Sicily, against Hiero, king of Syracuse. Hiero was defeated and retired, but the victors then attacked a Carthaginian force, which also had been sent to the assistance of the Mamertines, and defeated it. War was then declared against Carthage. It lasted 23 years, with various fortune. Though ignorant of naval matters, the Romans soon learned to defeat the Carthaginians at sea, after rapidly effecting the conquest of nearly all Sicily, making peace with Hiero, and leaving him in possession of his small but rich kingdom. Their first naval victory was won by C. Duilius in 260. It was followed by other successes, and Sardinia and Corsica were invaded. The Carthaginians were reduced to the defensive in Sicily, holding there only a few strong places. In 256 M. Regulus and his colleague Manlius defeated the Carthaginians in the greatest sea fight of those days, and then landed in Africa, which was incapable of making any resistance. Regulus was left to continue the work of conquest, with only 15,000 men; he was at length defeated, and his army destroyed and

himself taken captive, by an army commanded by the Greek Xanthippus. The Romans also lost two fleets by storms. They were more fortunate in Sicily, capturing Panormus, and totally routing the Carthaginian army that sought to recover the town. The Romans began the siege of Lilybæum in 250, building a third fleet to blockade it, but this was destroyed by the Carthaginians. Another fleet was lost at sea. Hamilcar now took command of the Carthaginians, and though but feebly supported he carried on the war with considerable success, the Romans still maintaining the siege of Lilybæum. A fourth Roman fleet was prepared, which destroyed that of Carthage. Peace was then made, on harsh terms to Carthage, and Sicily became the first Roman province. Taking advantage of the war that Carthage was compelled to wage with her mercenary soldiers, Rome demanded of her the cession of Sardinia and Corsica, and the sum of 1,200 talents, to which no resistance could be made. For some years there were but few campaigns, and in 235 the temple of Janus was closed. Colonies had been founded during the war with Carthage, and the number of tribes was increased to 35. The Romans first crossed the Adriatic in 229, when they conquered the Illyrians, and sent envoys to Greek states to explain their proceedings, who were well received. They were threatened with a Gallic war, which was to them always the source of peculiar terror, and it was ascertained that the whole number of available men was 750,000. The war began in 225 and lasted four years, the Gauls being beaten, and the Roman arms carried far toward the Alps. At this time were to be seen the beginnings of that popular party which was in later times to have so important a place in the republic, but the growth and action of which were stayed for a century by the operation of external events. A new war with Carthage was impending. The conquests of Hamilcar and Hasdrubal in Spain alarmed the Romans; and in 228 they concluded a treaty with Hasdrubal, by which it was arranged that the Carthaginians should not go beyond the Ebro. Hasdrubal was killed seven years later, and was succeeded by his brother-in-law Hannibal, who completed the Carthaginian empire in Spain to the south of the Ebro and the Douro. He besieged and took Saguntum, a Greek city in alliance with Rome. The Carthaginian government having refused to deliver up Hannibal for this action, Rome declared war in 219. The next year Hannibal marched to Italy, through Spain and Gaul, and reached that country in about seven months, with 26,000 men, having lost or dismissed nearly three fourths of his army, but many Gauls soon joined him. He defeated the consul Scipio on the Ticinus, his colleague Sempronius on the Trebia, and in 217 Flaminius at Lake Trasymenus. He made captives of the Romans who were taken, but dismissed the Italian allies, his

war being directed against Rome only. The Romans made Q. Fabius Maximus prodicator, and Hannibal, who marched south, was baffled by his strict defensive; but in 216 the consuls, Varro and L. Æmilius Paulus, gave battle at Cannæ, and were routed with immense slaughter. The Romans showed much firmness, and took their measures with such promptitude and vigor that immediate danger was soon removed; but they never thereafter dared to meet Hannibal in a pitched battle while he remained in Italy. Most of southern Italy now declared for Hannibal. The great city of Capua, which was almost capable of being the rival of Rome, opened her gates to him, and welcomed him as a deliverer. Had he been reinforced from home his purpose might have been accomplished; but at first it was impossible to send him assistance, and when it was sent the time for success had passed away. The Romans gradually recovered ground. They retook Capua after a long siege, which Hannibal could not raise, though he marched to Rome for that purpose, and threatened the city. Marcellus reconquered Sicily. In Spain, which they had invaded, they were less fortunate, the brothers Scipio being there defeated and slain. Wherever Hannibal was present he was almost invariably successful. In 207 his brother Hasdrubal, following his route from Spain, entered Italy, but he was defeated and killed on the Metaurus. Hannibal was forced to remain in Bruttium. In Spain the war was renewed with great vigor and complete success by P. Cornelius Scipio, then a young man. He was elected consul, with Sicily for his province, and had permission to carry the war into Africa, in accordance with the policy which he supported, but which was opposed by the old Roman leaders. Nothing happened in his consulship, but at its close he was appointed proconsul, and it was resolved that he should retain his command until the end of the war. In 204 he invaded Africa, and his successes were so decisive that Hannibal was recalled, and the war was ended by the victory of the Romans at Zama in 202. Peace was then made, Carthage accepting humiliating terms (201).—Rome had now become a conquering nation, and in 200 she made war on Macedonia, the king of which country had endeavored to assail her while she was engaged in the contest with Hannibal. She was victorious, Flamininus routing the army of Philip at Cynoscephalæ; she granted the vanquished moderate terms of peace, and nominally restored the Greeks to freedom, but really established her influence over Greece. A Syrian war was begun in 191, and ended with the defeat of Antiochus the Great at Magnesia, the Romans having entered Asia in 190. The Ætolians were reduced to submission, and the Galatians conquered without a declaration of war. The Italian Ligurians were also subdued, and the province of Cisalpine Gaul was created. In Spain the Roman dominion was great-

ly extended, so that nearly the whole peninsula acknowledged it for many years. Istria was reduced in 177. The last Macedonian war began in 171, and was closed in three years, by the victory of L. Æmilius Paulus over Perseus at Pydna. Rome was now virtual mistress of the East and the West, and protected Egypt against Syria, and ruled Greece through the tyrants that were established in her states. The legions crossed the Maritime Alps in 166, and took the first step toward the conquest of Gaul 12 years later. The Dalmatians were subdued in 155. A Macedonian rebellion was promptly quelled. The Achæan league was conquered in 146, and Corinth taken and destroyed; and Greece became a Roman province, called Achaia. The third Punic war, long urged by the elder Cato, was begun in 149 and ended in 146, when Carthage was taken and destroyed by the second Scipio Africanus. The wars in Spain, renewed in 149, were brought to a close at the end of 16 years, by the siege and destruction of Numantia, the work of Scipio. Lusitania, too, was annexed after the assassination of its gallant defender Viriathus in 140. The servile wars of Sicily broke out in 134, and the first continued two years. In Asia the Romans gained the kingdom of Pergamus, by will of its last monarch Attalus III. The tribune Tiberius Gracchus entered upon his course of agrarian legislation in 133. His object was to create a new body of Roman commons, by reviving the Licinian laws, with some modification. Though this was in fact a war against property holders, it was not a war against property, as the rich had obtained a monopoly of the public lands in defiance of law. Some of the best of the Roman statesmen supported Gracchus, but the evil he wished to cure was too deep-seated to be removed by legal means. Nothing less than a revolution could have effected the proposed change. During the long time that had elapsed since the passage of the Hortensian laws, there had grown up in Rome the party of the *optimates*, which was an exclusive aristocratical party, composed of both patricians and plebeians, and which enjoyed all the power of the state. The success of Gracchus would have been the destruction of this party; and its leaders opposed him until he was driven to the adoption of unconstitutional means of resistance, when he was slain by some of their number, in an outbreak which they had caused. The contest between the aristocracy and the people had now begun. The younger Scipio for a time acted as a moderator between parties, but he was assassinated; and Caius Gracchus resumed the projects of his brother, with additions, such as his law to distribute corn to the people, and another to transfer the judicial power from the senate to the equestrian order. He also purposed extending the Roman franchise. But he too failed, and was murdered in 121, while his adherents were put to death with every circumstance of illegality and cruel-

ty. From this time reform became impossible, and revolution, through the aid of the legions, was inevitable. The few years that followed the triumph of the *optimates* form the most corrupt period of Roman history. The effect of this corruption of the aristocracy was seen on the breaking out of the Jugurthine war in 111. The Roman armies were baffled through the arts of Jugurtha, who found their commanders accessible to his bribes, until first Metellus, and then Caius Marius, were appointed to conduct the war against him. The election of Marius to the consulship was a triumph of the people over the *optimates*, and he opened the legions to a lower class of men, which was an important step toward that change which made them the instruments of successful leaders. Numidia was conquered in 107, and Jugurtha was starved to death (104). The invasion of the Cimbrians and Teutons led to the repeated reelection of Marius; and he justified his countrymen's confidence by exterminating those barbarians (102, 101), after they had destroyed many Roman armies. The second servile war in Sicily, after lasting three years, was brought to an end in 99. The political contests of Rome now assumed a decisive character, and the failure of the Italians to obtain enfranchisement led to the social or Marsic war (90-88), in which the Romans were victorious, but voluntarily granted the franchise to the Italians. The appointment of Sulla to the command in the war against Mithridates, king of Pontus, caused the rivalry between that chief and Marius to assume the form of a bloody civil war, the result of which was to throw the whole power of the republic into the hands of Sulla, who was appointed perpetual dictator, which office he resigned after reconstructing the constitution according to aristocratic ideas. Sertorius, a partisan of Marius, having fled to Spain, for years braved there the best Roman generals, until removed by assassination (72). Sulla died in 78, and the changes that he had made lost their vitality with their creator. In the mean time the conquests of the Romans had been carried on in the East by Sulla, and subsequently by Lucullus and Pompey, who overthrew Mithridates, and defeated the king of Armenia. Pompey converted Syria into a Roman province, and made Judea virtually dependent upon the republic. The great servile war, in which the Thracian gladiator Spartacus headed the slaves, began in 73, and lasted nearly three years, much of Italy being in the hands of the slaves; and it was not until several powerful armies had been beaten, and forces of the greatest magnitude had been employed, that the insurgents were overthrown. Before his expedition to the East, Pompey subdued the Mediterranean pirates. The greatest man in Rome, Pompey had soon to encounter the rivalry of Julius Cæsar, while Cicero's services in baffling the conspiracy of Catiline (63) gave him a high degree of consideration, and the

wealth and civil and military talent of Crassus enabled him to control a powerful party. Through a coalition known as the first triumvirate, Cæsar, Crassus, and Pompey became virtual masters of their country (60); but the defeat and death of Crassus, in an expedition against Parthia, left supreme power to be struggled for by his associates. Cæsar had been appointed to the command in Gaul, the conquest of which country he completed, while he also invaded Germany and Britain. Nominally as the champion of the senate, Pompey broke with Cæsar, who in 49 advanced upon Rome at the head of some of his legions, and compelled his enemies to fly. In the contest that followed Cæsar was victorious, defeating his enemies, including Pompey, Ptolemy of Egypt, Pharnaces of the Bosphorus, Juba of Mauritania, the younger Cato, M. Scipio, and the sons of Pompey, in Italy, Spain, Greece, Egypt, Asia, and the province of Africa. He had concentrated all power in his person when he was assassinated in 44. His power passed into the hands of his nephew Octavius, who, with the aid of Lepidus and Antony, triumphed over the republican party, whose chief leaders were Brutus and Cassius. Octavius soon mastered his associates, and became lord of the Roman world, the most important addition to which made by himself was the kingdom of Egypt. Drusus and Tiberius, his stepsons, conquered in Germany, but Varus perished there with his legions. Octavius (or Octavianus) is generally considered the first of the emperors, and his undivided rule dates from 30 B. C. He assumed the title of Augustus, by which he has ever since been known. All the powers of the state were vested in him. His reign, which embraced a part of the golden age of Roman literature (see LATIN LANGUAGE AND LITERATURE), lasted until A. D. 14, and he was succeeded by Tiberius, his adopted son, who was of the Claudian gens, and in whose reign disappeared the last remnants of the old Roman constitution. Tiberius was succeeded in 37 by his grandnephew Caius, known as Caligula. After him reigned Claudius, and then Nero (54-68), the last of the emperors who could make any claim to connection, either by blood or by adoption, with the founder of the Julian imperial line. Tyranny and shameless corruption had reached their height. In the reign of Claudius Britain was conquered. The emperors Galba, Otho, and Vitellius followed each other in rapid succession, until the throne was occupied by the Flavian family in the person of Vespasian (69), who was succeeded by his son Titus (79-81), the conqueror of Jerusalem, whose successor was his brother Domitian. On this tyrant's assassination (96), the humane Nerva was made emperor. His successor was Trajan (98), who added Dacia to the empire, and who carried the Roman arms to the Persian gulf, conquering many countries of the East; but these conquests were abandoned by the next emperor, Hadrian (117-138),

who restored the Euphrates as the eastern boundary of the empire. Hadrian was succeeded by Antoninus Pius, whose heir was Marcus Aurelius Antoninus (161-180). The 84 years of the reigns of Nerva, Trajan, Hadrian, and the two Antonines are considered the happiest period of the Roman empire; and from the year of the accession of Commodus, son of Marcus Aurelius, A. D. 180, Gibbon dates the commencement of that empire's decline. At that time the empire consisted of Italy, Spain, Gaul, Britain, Rætia, Noricum and Pannonia, Dalmatia, Mœsia and Dacia, Thrace, Macedonia, and Greece; Asia Minor, Syria, Phœnicia, and Palestine; Egypt and all the north of Africa, and the Mediterranean with its islands. The population is estimated at 120,000,000. The emperor Commodus became one of the worst of the imperial tyrants, and was assassinated (192). His successor, Pertinax, was murdered by the prætorians, who sold the empire to Didius Julianus, to whom succeeded Septimius Severus (193). Severus's son Caracalla, and the successor of the latter, Elagabalus, rivalled Caligula and Nero in infamy. Most of the emperors who subsequently reigned were men of little ability down to Diocletian, including Maximin, the three Gordians, Philip, Balbinus, Valerian, Gallienus, Claudius II., Tacitus, Probus, Carus, Carinus, Numerian, and others, and their conduct accelerated the decline of the empire. Alexander Severus (222-35), Decius, and Aurelian are the principal exceptions, the last named conquering Zenobia and destroying Palmyra (273). Under the rule of Diocletian (284-305) the empire was so strengthened that its power enjoyed a certain revival; but its constitution was essentially changed by that sovereign. The principles of a despotism yet unknown were adopted and carried into effect by him, together with the usages and pomps of oriental courts, totally foreign to the ancient simplicity with which all but the more lascivious and vicious emperors had contented themselves. Diocletian associated with himself a colleague on the throne, Maximianus; and subsequently two others with the subordinate rank of Cæsar, each of the supreme rulers being henceforth styled Augustus. Rome then ceased to be the seat of government, Diocletian residing principally at Nicomedia in Bithynia, and Maximianus at Milan. The senate sunk into total insignificance, and from this period the emperors rarely appeared in the ancient capital, except on occasions of grand festivals or triumphs. Constantine the Great, the son of Constantius Chlorus, the first of the Christian emperors, after the death of the associate or rival rulers Maxentius, Galerius, Maximinus, and Licinius, formally transferred the capital to Byzantium, thenceforth called Constantinople, though its founder meant that it should be called New Rome. From that time, A. D. 330, should be dated the cessation of the Roman ascendancy, though the remains of the

empire continued to influence the world down to the middle of the 15th century, when Constantinople fell into the hands of the Turks. The Roman element was little known in the empire after the abandonment of the city on the Tiber, and that abandonment was the consequence of the change that had come over the world since the fall of the republic. Constantine only did that which other rulers had contemplated, in transferring the seat of empire permanently to some other place than Rome, that transference simply rounding and completing the imperial policy which had been inaugurated by the first of the Cæsars. He divided the empire on his death between his three sons. Constantine II. inherited Gaul, and attempted to seize Italy, which had fallen to the share of his youngest brother Constans, but was slain in the attempt, and Constans, master now of both Italy and Gaul, was subsequently assassinated by his general Magnentius. The whole empire finally came into the possession of the second brother, Constantius (351), who on his father's death had been assigned the provinces of the East. The northern barbarians, having penetrated into northern and eastern Gaul, were driven out by Julian, who succeeded to the purple in 361, restored paganism, and fell in 363 in an expedition into Persia. Paganism fell with him. The army conferred the crown upon Jovian, who bought a disgraceful peace and died before he reached Constantinople, leaving the selection of an emperor again to the soldiers. The choice fell upon Valentinian I., who appointed his brother Valens his colleague, and left to him the government of the East, with a part of Illyricum. The weak and unfortunate reign of Valens (364-378) was signalized by the overthrow of the Goths by the Huns, and the establishment of the defeated tribe within the limits of the empire. Revolting in consequence of their ill treatment by the Romans, they were attacked by Valens in person, defeated him at Adrianople, and forced him to take refuge in a hut, where he perished by fire. More than 60,000 Roman soldiers fell in this battle, and the Goths ravaged the whole country from the scene of the conflict to the walls of Constantinople. In this moment of danger the hopes of the East were turned on the court of Treves, where Gratian, the son of Valentinian I., ruled over the western division of the empire, while his younger brother, Valentinian II., governed Italy and Africa. Gratian chose as his colleague Theodosius, and caused him to be proclaimed emperor of the East (379). He himself, after a not inglorious reign (367-'83), was assassinated in a military insurrection, and succeeded by Maximus, who soon turned his arms against Valentinian II. and drove him out of Italy. Theodosius in the mean time had restored peace to the East, and was now enabled to attack the usurper, defeated him on the banks of the Save (388), and caused him to be put to death. Valentinian perished soon after by

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62° 67° 72° 77° Longitude 82° East from 87° Washington 92°



The Map shows the Roman Empire
at its greatest extent, in the begin-
ning of the 2nd Century A.D.

Longitude West 0 5° Longitude East 10° from Greenwich 15°



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the hand of a Frankish assassin, and Theodosius, who merited from posterity the surname of Great, was acknowledged in 394 without a rival or colleague throughout the whole Roman empire. His death the following year plunged everything again into confusion. The sovereignty was divided between his sons Arcadius and Honorius, and thenceforth there were two distinct empires, the further history of which will be found in the articles BYZANTINE EMPIRE and WESTERN EMPIRE. (For Roman antiquities, see the general or special articles on the various subjects, such as AQUEDUCT, ARMY, AUGURS, BATH, CALENDAR, CIRCUS, CIVIL LAW, COMITIA, CONSUL, FORUM, &c.)—*Description of Ancient Rome.* The ancient city of Rome was situated principally on the left bank of the Tiber, about 16 m. from the sea, and just on the N. border of Latium. From the Palatine hill, where it was originally founded, it spread over several adjacent eminences and the valleys between them, and became known as *urbs septicollis*, the "city of seven hills;" these were Mons Palatinus, Capitolinus, Esquilinus, Cælius, Aventinus, Quirinalis, and Viminalis. The Quirinal, Viminal, and Capitoline hills were occupied by the Sabines, and the Cælian, together with Mons Cispus and Mons Oppius, which are parts of the Esquiline, by the Etruscans. The Aventine hill was for a time not included within the *pomerium* (limits which could not be built upon, extending along the walls both on the outer and the inner sides, and in which auguries were taken). Ancus Martius is said to have built the first fortress on the Janiculum hill, on the right bank of the Tiber, beyond the limits of the ancient city. The walls ascribed to Servius Tullius enclosed all the seven hills, and were about seven miles in circumference. These fortifications had, as generally reported, 17 gates, though ancient writers are not all agreed concerning the number. In some places the steep sides of the hills were a sufficient protection without artificial fortification; in others the wall is known to have been over 60 ft. high and 50 ft. wide, faced exteriorly with flag stones and bordered by a ditch, and traces of it are still visible. The city was divided by Servius Tullius into four *regiones*, corresponding to the four tribes in which the citizens were classed; they were named Suburana, Esquilina, Collina, and Palatina. The Capitoline, as the seat of the gods, was not included in them. Augustus increased the number of *regiones* to 14, comprehending besides the city of Servius Tullius the suburbs which had since grown up. Each *regio* was subdivided into *vici*. At what time the Mons Janiculus, on the right bank of the Tiber, was encompassed by walls seems doubtful; it was fortified and connected with the left bank by a bridge as early as the time of Ancus Martius. The emperor Aurelian (270–275) began the new walls, which were completed under Probus, in 276. These fortifications, restored and perhaps amplified in circuit by

Honorius in 402, formed the actual defences of the city, not however including the Transtiberian quarter, on the right bank, which was first enclosed with walls by Pope Urban VIII. (1623–44). The region called Borgo, on the same side, which contains St. Peter's church and the Vatican, was protected by other walls built long anterior by Pope Leo IV. (847–55); and this quarter, like a separate city, was called after him *Civitas Leonina*, or the Leonine City. The walls of Aurelian and Honorius, as they now exist, are between 11 and 12 m. in circuit, and have 16 gates, three of which are now walled up as useless, and one, the Porta Septimiana, on the Transtiberian side, is surrounded by streets. Within this fortified circuit are five bridges spanning the Tiber (besides the ruins of two others), three of which are ancient: the Ælian, now the Ponte Sant' Angelo; the Fabrician, now the Ponte Quattro Capi; and the Cestian, now the Ponte San Bartolommeo. The last two connect the small island in the Tiber, now called Isola di San Bartolommeo, with the opposite banks. The number of streets is said to have been 215, the principal avenues being called *via* and *vici*, and the narrow ways *angustulus*. The main thoroughfare was the Via Sacra, which began in the valley between the Cælian and Esquiline mounts, and wound in a rather devious course westward, past the Flavian amphitheatre and under the arch of Titus, through the centre of the city to the capitol. The Via Lata and its continuation the Via Flaminia extended from the N. side of the capitol to the Porta Flaminia near the N. W. angle of the city. The Vicus Tuscus, running out of the Forum Romanum, contained many of the shops, and was celebrated by Horace for the rascally character of its inhabitants. The Vicus Sandalarius was the place where shoemakers congregated, and also the quarter of some of the booksellers. The whole valley between the Esquiline, Viminal, and Quirinal hills, a little N. E. of the centre of the city, was called the Subura, and through it ran a street of the same name. This was the scene of most of the bustle and wickedness of the city, and the seat of the principal shops and brothels. The Carinæ, a district just without the limits of this noisy region, was the residence of Pompey, Cicero, and many other distinguished persons. Here and there were open places called *fora* and *campi*, the former being intended for the transaction of business, and the latter for pleasure grounds. The *fora* were level oblong spaces, paved, and surrounded with buildings of various kinds, and were either *fora civilia*, where justice was administered and other public matters were attended to, or *fora venalia*, which answered very nearly to modern market places. The Forum Romanum, sometimes called simply the forum, or *forum magnum* or *vetus*, occupied a space between the Capitoline and Palatine hills, and was the most important of

the 19 Roman fora. (See FORUM.) Among the others were the Forum Julium or Cæsar's, close behind the former; the Forum Augusti; the Forum Nervæ or *transitorium*, intended merely as a passageway from the two preceding to the temple of Peace; and the Forum Trajani. But little of the splendid forum of Trajan is now visible, except the celebrated column. Most of the magnificent buildings founded by that emperor within the limits of his forum were left for ages in ruin and buried under earthworks. Excavations begun by the French early in the present century, and continued by the pontifical government after the restoration of Pius VII., resulted in the discovery of some remains of the Ulpian basilica, so called from the family name of the founder (Ulpian Trajanus), and other fragments of antique structures, strewn over an area not more than one twelfth of the space occupied by Trajan's buildings. In this narrow place, below the level of the surrounding piazza Traiana, is all that now remains visible of the ruins of those magnificent structures. The Campus Martius, at the N. W. side of the ancient city, was almost entirely occupied by public buildings, temples (among which was the Pantheon), the mausoleum of Augustus, and pleasure grounds. This region is now covered by the modern city, and contains those streets and piazzas where the population is most dense. (See CAMPUS.) The Campus Sceleratus was the spot where vestals who had violated their vows were buried alive, and the Campus Esquilinus was originally used for the execution of criminals and the burial of the poor, though the greater part of it was afterward converted into pleasure grounds. Besides these places of public resort, there were beautiful private parks and gardens on the hills around the city.—The houses of Rome were divided into two classes, the *domus*, or residences of the nobles, corresponding to the modern *palazzi*, and the *insulæ* or dwellings of the middle and lower classes, which were often let out by floors or apartments after the modern fashion. These *insulæ* were sometimes carried up so many stories that a law was passed forbidding any house to be built more than 70 ft. high—a regulation all the more necessary as every house was surrounded by an open space of at least 5 ft. The *domus* had porticoes in front and inner courts called *atria*. The *insulæ* perhaps had smaller courts within, and in place of the porticoes they had open spaces which served for shops and workshops. The common building material was brick, at least before the time of Augustus; the upper story of the *domus* was generally of wood. Under the emperors more costly materials, such as marble and other stone, came into frequent use; and when Nero rebuilt the city after the great fire, he employed a kind of volcanic rock now called *peperino*, formed by the cementing together of sand and cinders. He also dispensed with the wooden upper story, and took pains to

make the streets wide and straight. Most of the *domus* were situated at the E. end of the city on the Quirinal, Viminal, and Esquiline hills; they did not form streets, but were built in the midst of large gardens and fields. The city is supposed to have reached its greatest size in the time of Vespasian, when it was 13 m. in circuit, and embraced a population probably not much under 2,000,000, of whom about half were slaves. The public edifices during the palmiest days of the empire were of almost unparalleled magnificence. The high grounds of the Quirinal, Viminal, Esquiline, and Aventine hills were mostly occupied by the populous quarters of the ancient city, but were covered in some parts by private gardens, as those of Mæcenas on the Esquiline. The Capitoline hill was almost entirely covered by public edifices, with the *arx* (citadel) on its highest point, the Tarpeian rock. The most splendid of the many temples on this hill was that of Jupiter Capitolinus, the exact site of which is still in dispute among antiquaries. (See CAPITOL.) Latin writers, when using the name "Capitolium," usually imply this great temple, the most important and magnificent in Rome. The residence on the Palatine hill, which finally became developed into the vast palace of the Cæsars, was originally the private house of the orator Hortensius, which was inhabited by Augustus and rebuilt for his use at the public expense. New buildings were raised for themselves by successive emperors, till the greater part of the hill was covered by their splendid structures. Nero built more than any other emperor, and after his first great palace had been destroyed by the most disastrous conflagration that ever visited Rome (A. D. 64), he began another, the edifices, gardens, and pleasure grounds of which extended over the Palatine, Esquiline, and Cælian hills, and the intervening valleys. This immense palace, the Domus Aurea of Nero, was almost totally demolished by Vespasian. There were several *curiæ*, or senate houses, and the senators sometimes assembled in temples, especially in that of Concord, on the southern slope of the Capitoline hill. The Curia Hostilia, the most ancient senate house, said to have been founded by Tullus Hostilius, was burned down during the tumultuous funeral of the tribune Clodius in 52 B. C., and was first restored by Faustus, the son of Sulla. This later building having been taken down, a new curia was begun, or at least projected, by Julius Cæsar, and after his death completed, if not actually founded, by Augustus, who dedicated it, in his great uncle's name, as the Curia Julia. Its exact site cannot be determined, but Roman antiquaries recognize it in the ruins of a large structure, built in brickwork like that of the Augustan age, below the N. E. declivity of the Palatine, and therefore in the immediate vicinity of the forum at its S. W. limit. The Curia Pompeiana, which was abandoned after it had been stained by the blood of Cæsar, who was there

assassinated, was one among many superb edifices raised by Pompey the Great. This, together with a theatre, a temple of Venus, and a portico with 500 columns, stood between the western side of the Campus Martius and the Tiber. A few remains of this temple and theatre were visible, till concealed by recent buildings, in the cellars of a modern palace. The basilicas were chief courts of justice presided over by the urban prefects, in which the emperors themselves often heard causes and administered justice. Among these, the most splendid one founded under the republic was the Basilica Æmilia, so called after its founder Æmilius Paulus, 179 B. C. It is supposed that a remnant of it is preserved in the outer walls of Sant' Adriano, a church on the N. E. side of the forum. Three other basilicas founded under the republic (in the 2d century B. C.), the Porcian, the Sempronian, and the Opimian, have totally disappeared. The Julian, founded by Augustus and dedicated to Julius Cæsar, still exists in extensive but low and roofless ruins on the W. side of the principal forum. These ruins were brought to light through works undertaken by the pontifical and recently finished under the royal government. Among favorite places of resort for business or recreation were the porticoes, several of which, with far-extending colonnades, ornamented ancient Rome. One, built by Agrippa in the Campus Martius, was called Porticus Argonautarum, from a picture or series of pictures on its walls illustrating the Argonautic expedition. The only one of these porticoes the ruins of which are still considerable is that built by Augustus and named after his sister Octavia. Within the quadrangle of colonnades forming this portico stood temples of Jupiter and Juno, both wholly destroyed. We find mention of only two prisons in ancient Rome, the oldest being that founded by Ancus Martius and said to have been enlarged by Servius Tullius. Two dark subterranean chambers of these ancient prisons, known as the Mamertine, and entered below a church on the principal forum, were long ago consecrated and are still used as chapels, because supposed to have been the place where St. Peter and St. Paul were confined, and from which they were led to death. Five other vaulted chambers, mostly built of similar stonework, have recently been cleared out (one of them had long been used as a safe for butcher's meat), and are now recognized as pertaining to the same prisons, and ascribable therefore to the time of the kings. Another ancient prison was destroyed and a temple of Piety raised on its site, in commemoration of the act of the Roman daughter who saved the life of a parent condemned to die in that dungeon; a well known story narrated by Pliny the Elder and by Valerius Maximus. The military were quartered in two great camps, walled around and defended like fortresses, beyond the limits of the primitive city, the *castra prætorialia*

at the N. E. extremity of the city, beyond the walls of Servius Tullius, and the *castra peregrina*, on the Cælian hill. The former, built by Tiberius, was occupied by the prætorian guards, and the latter by foreign legions. The aqueducts, the most stupendous works of their kind in the world, and the sewers, the chief of which, called *cloaca maxima*, is still in excellent preservation, are described elsewhere. (See *AQUEDUCT*, and *CLOACÆ*.) Scarcely surpassed by any of the public edifices were the *thermæ* or baths, whose name conveys but a very imperfect idea of the various uses to which they were devoted. Besides the apartments for bathing (see *BATH*), they contained places for athletic exercises, public halls, vestibules and porticoes for lounging and conversation, shaded walks and gardens, fountains, libraries, and collections of paintings and sculptures. The *thermæ* of Antoninus, built principally by Caracalla and completed by Alexander Severus, had accommodations for 2,300 bathers at the same time, and the *thermæ* of Diocletian for 3,000. The latter was the most extensive building of the kind in Rome. Those of Agrippa or Alexander Severus, Nero, Titus, Trajan, Commodus, and Constantine were also celebrated; and there were several smaller ones, besides a great number of *balneæ* or common baths. There were only three theatres proper, those of Pompey, Cornelius Balbus, and Marcellus. The first was in the Campus Martius, and had seats for 40,000 spectators; the second, near the Tiber, where the Cenci palace now stands, could contain 11,600 people; and the third, in the S. part of the Campus Martius, between the Capitoline and the river, could hold 20,000. The first theatres were mere temporary structures of wood, though even these were sometimes of extravagant splendor, like that upon which M. Æmilius Scaurus wasted an enormous fortune, and which was large enough to seat 80,000 spectators. The stage was decorated with 360 columns, arranged in three stories, the lowest of white marble, the middle of glass, and the uppermost of gilt wood. The *odeum* in the Campus Martius was a sort of music hall, and was capable of accommodating 11,000 persons. The circus dates its introduction into Rome long prior to the erection of permanent theatres. (See *CIRCUS*.) Amphitheatres, for gladiatorial combats and shows of wild beasts, were at first built of wood and taken to pieces after the performances were over (see *AMPHITHEATRE*); the first stone edifice of the kind was erected by Statilius Taurus in 80 B. C. Another was begun by Caligula, but never finished. The great Flavian amphitheatre, founded by the emperor Vespasian (of the Flavian family) about A. D. 72, dedicated by his son Titus in 80, and called the Colosseum from its vast size, is still in its ruinous state among the most imposing of Roman antiquities. Excavations carried on in its interior by the government since 1873 have brought

to light many complicated structures, elliptic arcades, chambers, and long vaulted corridors, about 22 ft. lower than the level formerly supposed to be that of the ancient arena. (See *COLOSSEUM*.) Among the numerous temples of the city, the two most magnificent were those of Jupiter Capitolinus and of Venus and Rome; the former, on the Capitoline hill, founded by Tarquinius Priscus, and several times rebuilt, the last time by Domitian, being undoubtedly the larger; the latter, founded by Hadrian, probably the richest in decoration. The temples still conspicuous in ruin in the forum and on the slope of the Capitoline hill are those of Castor and Pollux, of Saturn, and of Vespasian and Titus. That dedicated by Antoninus Pius to his deceased wife Faustina still partially exists in a magnificent peristyle with monolithic columns, and the massive stone walls of the cella, or sanctuary, near the S. E. angle of the forum. The circular temple with a graceful marble colonnade of the Corinthian order, close to the Tiber, which was long misnamed the temple of Vesta, is now generally assigned to Hercules, to whom many temples in Rome were dedicated. The real temple of Venus, said to have been founded by Numa, is now recognized in the low, massively constructed remnant of a circular building at the S. W. extremity of the forum, brought to light by excavations made in 1873. Most interesting is another discovery, in the same vicinity, of an edifice so ruinous that even the style of its architecture is not distinguishable, but which may be recognized beyond doubt as the *Ædes Cæsaris*, a temple raised by Augustus on the spot where the body of Julius Cæsar was consumed in the flames after his funeral. In front of this building is still seen the *Rostra Julii*, a semicircular platform of stone which Augustus erected before the threshold. The temple of Pallas, in the forum of Nerva, existed, still beautiful in ruins, till 1612, when it was taken down in order to use its columns and marbles for the construction of a large fountain erected by Pope Paul V. on the Janiculan hill. The Pantheon was dedicated, according to common belief, to all the gods, though Dion Cassius says it was sacred to Mars and Venus. (See *PANTHEON*.) Prominent among the

other remarkable features of the city were the triumphal arches thrown across the principal streets in commemoration of victories; 21 are

mentioned, of which the most important are the arch of Titus, on the Via Sacra, of Pentelic marble, built to celebrate the capture



Arch of Titus.

of Jerusalem, and still standing; the arch of Septimius Severus, of the same material, at the entrance of the Via Sacra into the forum;



Arch of Constantine.

the arch of Constantine, at the mouth of the valley between the Palatine and Cælian hills, with three archways, adorned with beautiful

columns, bass reliefs, and statues, erected to commemorate the victory over Maxentius; and the arches of Dolabella, Gallienus, and Drusus. The most interesting of the columns erected in various parts of the city is that of Trajan, in the forum of Trajan, which was dedicated to that emperor by the senate and Roman people in commemoration of his victory over the Dacians. It is composed of 34 pieces of white marble, 9 of which form the base, 23 the shaft, and 2 the torus and capital. The height of the entire column, exclusive of the statue on its summit, is $127\frac{1}{2}$ ft., and of the shaft alone, $97\frac{1}{4}$ ft. The base and capital are of the Tuscan order, the shaft Doric, and the mouldings of the pedestal Corinthian. A series of bass reliefs form a spiral around the



Forum and Column of Trajan.

shaft from the base to the summit, representing the military achievements of the emperor. There are 2,500 human figures in the sculptures, and many horses, military engines, and weapons. The column was formerly surmounted by a statue of Trajan, but its place is now occupied by one of St. Peter, which was erected by Sixtus V. In the interior of the column is a spiral staircase of 184 steps. The column of Marcus Aurelius Antoninus, in the piazza Colonna, erected A. D. 174, is similar to that of Trajan, but inferior in design and execution. Its height is 122 ft. 8 in., the shaft being $97\frac{1}{4}$ ft. On the summit is a statue of St. Paul, placed there by Sixtus V. Of the many obelisks in Rome, the highest is that of the

Lateran, the shaft of which is 105 ft. 7 in. It was brought from Heliopolis to Alexandria by Constantine the Great, and removed by his son Constantius to Rome. The obelisk of the Vatican was brought from Heliopolis by Caligula. The obelisk of Santa Maria Maggiore is one of the two which formerly stood at the entrance of the mausoleum of Augustus; they are supposed to have been brought from Egypt by Claudius. The obelisk of the piazza del Popolo once stood before the temple of the sun at Heliopolis, whence it was removed to Rome by Augustus. Another obelisk, that of Monte Citorio, was also brought to Rome from Heliopolis by Augustus. The mausoleum of Augustus, in the Campus Martius, surrounded by a large park, was built by that emperor as the burial place of the imperial family, and was one of the most magnificent edifices of his reign. The mausoleum of Hadrian is now the castle Sant' Angelo. The tomb of the Scipios was discovered in 1780; and among the other most imposing sepulchral monuments were the tombs of Cæcilia Metella, Cestius, and Septimius Severus.—*Modern Rome.* The modern city occupies very nearly the same space as the ancient; lat. of the observatory of the collegio Romano, $41^{\circ} 53' 52''$ N., lon: $12^{\circ} 28' 40''$ E.; pop. in 1846, 180,000; in 1852, 175,838; in 1858, 180,359; in 1872, 244,484. Since the change of government in 1870, the population has rapidly increased, but many new streets opened since then are yet scarcely inhabited. The Tiber has a course within the walls of about 3 m., and is crossed by five bridges, viz.: the Ponte Sant' Angelo, the ancient Pons Ælius, opposite the castle of Sant' Angelo at the N. W. end of the city; the Ponte Sisto, built by Sixtus IV. in 1474 on the ruins of the Pons Janiculensis, connecting the city proper with the quarter of Trastevere; the Ponte di Quattro Capi (so called from a four-headed statue of Janus), the ancient Pons Fabricius, and the Ponte San Bartolommeo, the ancient Pons Cestius, connecting the Isola di San Bartolommeo, the former with the city, and the latter with the Trastevere; and the Ponte Rotto, on the site of the ancient Pons Æmilius; this last was partly washed away in 1598, and a suspension bridge now extends from the remaining portion to the shore. The ruins of the old Pons Triumphalis and Pons Subicius are visible when the water is low. The walls are nearly 13 m. in circuit, those on the left bank of the river following the line of the wall of Aurelian; they have been so often repaired that it is difficult to assign a date to any portion of them. On the outside they are 50 ft. high, on the inside generally less than 30. They have no ditch, but are crested with about 300 towers and pierced by 13 gates still in use. The general level of the city has been considerably raised by the rubbish accruing from long habitation and from the ruins of ancient edifices, so that the lower parts are estimated to be at least 15 ft. higher than they were in

the days of the Cæsars. The modern city is chiefly on the low land, the hills being mostly covered with vineyards, cornfields, and villas. The closely built part is about 2 m. in length,

these divisions are on the left bank and 2 on the right bank of the river. 1. The rione de' Monti is the largest quarter, containing, among other public buildings and monuments, the

column of Trajan; the church of St. John Lateran, the chief church of the city in point of antiquity and ecclesiastical dignity (see LATERAN); the church of Sta. Bibiana, which covers the relics of 5,260 martyrs; the splendid church of Sta. Maria Maggiore, with the Sistine and Borghese chapels; the villas Albani and Borghese, and the ruins of the baths of Titus and Diocletian. 2. The rione di Trevi contains the Corso; the piazza di Monte Cavallo, in which stand two colossal antique statues of horses; the Quirinal, formerly the pope's ordinary residence, now the royal palace; the palazzo della Consul-



Babbuino.

Corso.

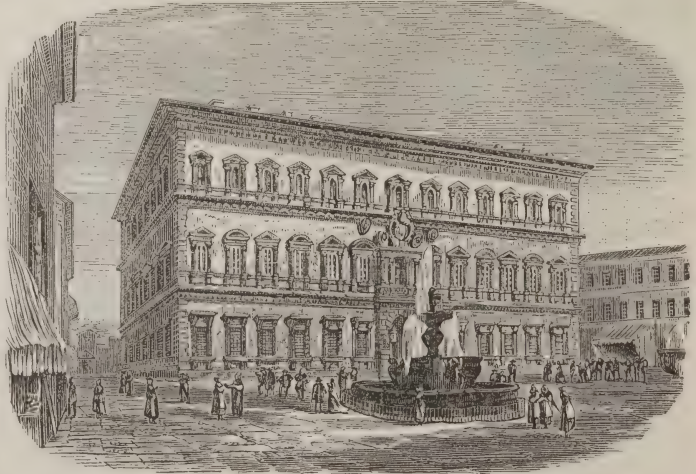
Ripetta.

Piazza del Popolo.

with a breadth of from 1 to $1\frac{1}{2}$ m. Many of the streets are long, but they are mostly narrow and crooked. They have seldom any foot pavement, and are often filthy, and present in their architecture a mixture of magnificence and meanness, stately palaces and churches alternating with miserable huts. The three finest streets diverge from a square called the piazza del Popolo near the N. gate. These are: 1, the Corso, which extends to the foot of the capitol and is a mile long, perfectly straight, 50 ft. wide, with foot pavements on each side; it is the great public walk of the city; 2, the strada del Babbuino, which runs to the piazza di Spagna; 3, the strada di Ripetta, which leads to the Tiber. The houses of Rome are generally lofty, and are mostly built of brick and tufa, marble being less commonly used than

in the cities of northern Italy. The city is divided into 14 *rioni* or quarters, corresponding to the 14 regions of Augustus, but not resembling them in size or situation; 12 of

ta; and the magnificent Barberini palace, rich in treasures of art and literature. 3. In the rione di Colonna stand the column of Antoninus, the Pantheon, the palace of the propaganda, and the piazza di Spagna, one of the finest squares of the city. 4. The rione di



Farnese Palace.

in the cities of northern Italy. The city is divided into 14 *rioni* or quarters, corresponding to the 14 regions of Augustus, but not resembling them in size or situation; 12 of

Campo Marzo comprises most of the area of the ancient Campus Martius, the porta del Popolo (the chief entrance to the city on the N. side), the mausoleum of Augustus, the Pincian

hill with the public gardens on its terraced summit, and about one third of the Corso. 5. The rione di Ponte contains one of the finest streets in Rome, the strada Giulia. 6. The rione di Parione contains the Orsini and Pamphili palaces, and the place Pasquino, where formerly stood the statue of Pasquin. 7. The rione della Regola contains the churches of San Girolamo della Carità and San Tommaso, the English college, and the celebrated Farnese palace. 8. The rione di Sant' Eustachio contains the church of that saint and the university. 9. The rione della Pigna contains the beautiful Dominican convent and church of La Minerva. 10. The rione Campitelli contains the forum, the Colosseum, the basilica of Maxentius, and the Capitoline hill, on which stand the three modern palaces appropriated for the assemblies of the magistrates, the observatory, and the fine art collections. The gallery of sculpture in one of these *palazzi* contains many of the

most precious antiques, among which are the so-called "Dying Gladiator," now recognized as a Gallic chief dying in battle, the statues of Marcellus and Agrippina, the Venus of the capitol, and the complete series of busts of the Roman emperors. 11. The rione Sant' Angelo contains the beautiful ruins of the portico of Octavia, and the Ghetto, or the quarter in which the Jewish inhabitants were confined under the papal government, though allowed to have shops elsewhere. 12. The rione Ripa contains the immense *thermæ* of Antoninus (Caracalla), the temple of Fortuna Virilis, the temple of Hercules, long miscalled that of Vesta, the Tiber island, on which are some remains of the temple of Æsculapius, the Monte Testaccio, the pyramid of Cestius, and the burial place of Protestants. 13. The rione Trastevere, the ancient Janiculum, on the W. side of the Tiber, contains the great fountain of Aqua Paola, a botanical garden, the villa Corsini, and the



Bridge and Castle of Sant' Angelo, with St. Peter's in the distance.

church of San Pietro in Montorio. 14. The rione di Borgo contains the castle of Sant' Angelo, the citadel, the centre or nucleus of which was the mausoleum of Hadrian. This castle is now of little importance as a fortress, and is chiefly used as a state prison. It communicates by a long covered gallery with the palace of the Vatican, an immense edifice, almost unrivalled for its internal splendor and magnificence. Among its treasures of literature and art are the great library, chiefly rich in rare manuscripts; the tapestry chambers, hung with tapestry copied from the cartoons of Raphael; picture and sculpture galleries filled with masterpieces of the highest order; the *camere* and *loggie*, painted in fresco by Raphael and his pupils; and the Sistine and Pauline chapels, painted in fresco by Michel Angelo. (See VATICAN.) Celebrated statues and pictures also adorn other palaces and churches of the city; and besides the great collection of the Vatican there are 10 or 11 public libraries,

two of which, the Angelica and the Casanatense, have more than 100,000 volumes each and many valuable manuscripts. There are in the city about 360 churches and 180 conventual edifices; but many of the convents and monasteries have been suppressed since the occupation of the city by the Italian government, and the buildings converted to public uses. Preëminent among the Christian temples of the world is St. Peter's church, the work of many popes and architects, finally consecrated by Urban VIII. in 1626, which Gibbon calls "the most glorious structure that has ever been applied to the use of religion." (See CATHEDRAL.) Externally the work, though magnificent in materials and dimensions, is disfigured by the prominence of the front added by Maderno, which almost hides from the near spectator the principal feature, the vast and towering dome; while, had the original plan of Bramante and Michel Angelo been followed, the whole dome would have been



St. Peter's Church and the Vatican Palace.

visible from the square before the church. But the dome itself and the interior of the edifice are held to be unrivalled in magnitude, proportion, and decoration. The church of St. Paul "outside the walls," destroyed by fire in 1823 and rebuilt and dedicated in 1854, is also a masterpiece of magnificence in architecture and decoration. Like the ancient St. Peter's, it was originally founded by the emperor Constantine. The first English Protestant church ever erected within the walls of Rome was opened Oct. 26, 1874. It is a handsome edifice, built of *pietra serena* on the basilica plan, but without aisles, and is situated on the piazza San Silvestro, E. of the Corso. The former English church, outside the porta del Popolo, still continues its services. The palaces of the Roman nobles are numerous and large, but are generally more remarkable for internal than for external splendor. Their walls are usually of brick stuccoed, and their chief external ornament is a rich cornice. The principal of these mansions are the palazzi Doria, Ruspoli, Corsini, Orsini, Giustiniani, Altieri, Ciciaporci, Farnese, Barberini, and Colonna. There are several palaces which, from being surrounded by extensive gardens, are called villas. Of these the principal is the villa Borghese, whose gardens, nearly 3 m. in circuit, are open to the public, and form the most fashionable promenade in Rome.—There are many squares in the city, consisting of small paved areas, generally adorned with fountains

and monuments. The large oval area in front of St. Peter's is surrounded by a superb colonnade, and in the middle between two fountains is an Egyptian obelisk 78 ft. in height. The square next in size is the piazza Navona, which is about 840 ft. in length, and has in the centre an elegant fountain, the finest in Rome. Fountains are numerous throughout the city, and form one of its most striking and attractive features. They are copiously supplied with water by three aqueducts which still remain in operation, of the many that poured their streams into the ancient city. Among the most curious remains of ancient Rome are the catacombs. (See CATACOMBS.)—The manufactures of Rome are various, though not extensive. The principal are of woollens, silks, velvets, hats, gloves, stockings, leather, glue, glass bottles, liqueurs, pomade, artificial flowers, mosaics, jewelry, and articles connected with the fine arts. The city is a great resort for foreigners, of whom the English, French, and Americans are the most numerous, and is a favorite place of residence and study for foreign artists. The climate is mild, but relaxing and oppressive in summer. Rains are frequent and heavy in November and December, and there is usually a little snow in the winter, which seldom remains more than a few hours. The *tramontana*, a disagreeable cold north wind, sometimes blows for several days at a time. The malaria fever, so much dreaded, may be avoided by proper

precautions, and may be expected ultimately to disappear, through the cultivation of the Campagna, improved drainage, and increase of population both within the walls and over the surrounding districts, hitherto left uncultivated and uninhabited. (See CAMPAGNA DI ROMA, LATIUM, and PONTINE MARSHES.) A new city is now springing up on the higher grounds on the Esquiline and Viminal hills. The official report for 1873 shows that the sanitary condition of Rome is better than is generally supposed, the average death rate being about 34 in 1,000. The people of Rome, at least the middle and working classes, are stout and well formed, the women being remarkable for beauty and a certain majesty of air and mien. The public amusements are theatrical performances, concerts, and religious celebrations. The most noted festival is the carnival, which immediately precedes the season of Lent. The chief educational institution is the university, which has professors in theology, law, medicine, philosophy, the fine arts, and the Greek, Hebrew, Syriac, and Arabic languages. It had 470 students in 1875. The college *de propaganda fide* has a rich library and a printing office which contain works in 30 languages. There are several other colleges and many learned societies, the principal of which are the academies of Roman history, of geography, of ecclesiastical history, of antiquities, and of the Arcadians. Much has been done for public education by the new government. At the close of 1873 there were 14,389 pupils in the new elementary schools. A female seminary was opened in 1874.—During the turbulent and ignorant ages which succeeded the downfall of the western empire (see ITALY), the city of Rome slowly sank to a state of degradation and decay, which reached its greatest depth about the end of the 8th century, when little more remained than is now visible, while the modern city had not yet begun to be constructed. The population at this period is supposed to have dwindled to about 13,000. The popes, however, soon began to assert their supremacy over the potentates around them, and exerted themselves to restore and enlarge their capital. (See PAPAL STATES, and POPE.) Leo IV. made a large accession to the city about 850, and under the influence of peace and stable government the population rapidly increased. In the 11th century the city suffered severely from the attacks of the emperor Henry IV. in his wars with Gregory VII.; still at the end of this century its population had grown to 35,000. In the 14th century the prosperity of the city was checked by the removal of the papal see to Avignon, and was not materially promoted by the brief splendor of the rule of Rienzi. After the return of the popes in 1377, a long period of turbulence and civil strife succeeded, in which the Colonna and Orsini families were the principal actors; but at length, about 1417, the authority of the

popes prevailed, and during the 15th and 16th centuries the city was enlarged to nearly its present dimensions and adorned with its principal churches and palaces. By the middle of the 17th century it had attained its highest state of population and magnificence in modern times. The only great calamity which befell it during these last three centuries was the storming and pillaging by the army of the constable de Bourbon in 1528. In 1798 Rome was occupied by the French, who sent the pope to France, and proclaimed a republic, which was suppressed by the allies in 1799 and the pope restored. In 1808 the city was again occupied by the troops of Napoleon, and in the following year annexed to his empire. The pope was restored on the downfall of Napoleon in 1814, and the city remained in peace till in 1848 revolutionary movements began, which resulted in the expulsion of the pope and the establishment of a republic in February, 1849, at the head of which were Mazzini, Armellini, and Saffi. The new republic, though bravely defended by Garibaldi, was speedily suppressed by the French army, which, after a siege of two months, compelled it to surrender on July 1. The French occupation lasted till the close of 1866, when the troops were almost entirely withdrawn from the Papal States by Napoleon III. In 1867 the occupation was resumed in consequence of an invasion of the papal territory (reduced since 1860 to little more than one third of its previous extent) by an army of Italian volunteers led by Garibaldi. The siege and capture of Monte Rotondo, a small town 14 m. from Rome, by Garibaldi, was soon followed by the defeat of the volunteers at Mentana, Nov. 3, 1867, through French intervention, which secured victory for the pontifical cause, and for the time rescued that government from its opponents. After these events a French force continued to occupy Civit  Vecchia, but not the city of Rome, until 1870, when the troops were again withdrawn on account of the Franco-German war. Soon after the deposition of Napoleon III., Rome was occupied (Sept. 20, 1870) by an Italian army, after a very brief resistance. A plebiscitum held in the following October declared, by an immense majority, the will of the citizens to submit to the constitutional government of the king of Italy. The temporal sovereignty of the pope was in consequence abolished. (See PIUS IX.) Rome was declared the capital of the Italian kingdom, and became thenceforth the seat of the new government, where the royal court has its residence, and the Italian parliament holds its sessions. The first session of parliament was opened on Nov. 27, 1871. On Sept. 20, 1874, a stone in commemoration of the occupation of the city by the Italian troops was erected near the porta Pia. It contains the names of 33 soldiers who fell in the conflict with the papal forces.—Among the principal modern books on ancient Roman history

are Niebuhr's *Römische Geschichte* (3 vols., Berlin, 1811-'32; 2d ed., 1827-'42); Arnold's "History of Rome" (3 vols., London, 1838-'42); Gibbon's "Decline and Fall of the Roman Empire," edited by Milman (12 vols., 1838-'9; 2d ed., 1845); Merivale's "Fall of the Roman Republic" (1853) and "History of the Romans under the Empire" (7 vols., 1850-'62); Mommsen's *Römische Geschichte* (3 vols., Berlin, 1854-'6; translated into English, 1862-'3); and Ihne's *Römische Geschichte* (Leipsic, 1868 *et seq.*). For fuller descriptions of the city of Rome see Franz Reber, *Die Ruinen Roms und der Campagna* (Leipsic, 1863); Robert Burn, "Rome and the Campagna, an Historical and Topographical Description of the Site, Buildings, and Neighborhood of Ancient Rome" (Cambridge and London, 1871); Augustus J. C. Hare, "Walks in Rome" (London, 1871); Francis Wey, "Rome" (1872); and Charles Isidore Hemans, "Historic and Monumental Rome" (1874). See also Gregorovius, *Geschichte der Stadt Rom in Mittelalter* (8 vols., Stuttgart, 1859-'72; 3d ed., 1874).

ROMILLY, I. Sir Samuel, an English jurist, born in London, March 1, 1757, died there by his own hand, Nov. 2, 1818. He was descended from French Protestant refugees, was distinguished as a chancery lawyer, and in 1806 was appointed solicitor general. He was elected to the house of commons, and for many years strenuously advocated parliamentary reform, the abolition of the slave trade, the emancipation of the Roman Catholics, and the mitigation of the criminal code. Down to 1818 he had represented "pocket boroughs." In that year he was returned for Westminster without solicitation, but the death of his wife and other sorrows deranged his mind, and led him to commit suicide. His autobiography was published in 1840, in 3 vols. **II.** John, baron, an English jurist, son of the preceding, born in London in 1802, died there, Dec. 23, 1874. He graduated at Trinity college, Cambridge, in 1826, and was called to the bar at Gray's Inn in 1824. He was a member of parliament for Bridport, as a supporter of Lord Grey's administration, from 1832 to 1835, and for a short time in 1846-'7, and for Devonport in 1847-'52. He was solicitor general from 1848 to 1850, when he was knighted, attorney general in 1850-'51, and master of the rolls from 1851 to 1872. He was raised to the peerage in 1866 as Baron Romilly of Barry, in the county of Glamorgan.

ROMNEY, George, an English painter, born at Furness, Lancashire, Dec. 15, 1734, died at Kendal, Nov. 15, 1802. At the age of 23 he began painting at York, in 1762 established himself in London, and in 1763 obtained the second premium of 50 guineas, offered by the society of artists, by a picture of the "Death of Gen. Wolfe." In 1773 he went to Italy, and studied the works of Michel Angelo and Raphael. After his return in 1775 he was a popular painter of portraits. He did not be-

long to the royal academy, and sent no pictures to its exhibitions; moreover there was an ill feeling and rivalry between himself and its president, Sir Joshua Reynolds. In 1756 he had contracted marriage with a young woman at Kendal, but on going to London he left her with two children, and during his prosperity never called her to share his fortune, and even concealed the fact of his marriage. But when his health declined in 1799 he went to live with her, becoming imbecile a year later.

ROMULUS, the legendary founder of Rome. Amulius, the younger son of Procas, king of Alba Longa, after the death of his father seized on the throne rightfully belonging to his brother Numitor, and made the daughter of the latter, Rhea Silvia, a vestal virgin. By the god Mars she had two children, who as soon as they were born were ordered by Amulius to be thrown into the Tiber. The river had overflowed, and the basket in which the boys Romulus and Remus were placed was carried to the foot of the Palatine hill, and left on dry land. A she wolf carried them to her cave, and suckled them; and they were found by Faustulus, the king's herdsman, who took them home, and brought them up with his own sons. When they had grown up, the herdsmen of the Palatine hill had a quarrel with the herdsmen of Numitor, in which Remus was taken prisoner, and the expedition of Romulus to deliver his brother resulted in the discovery of their birth, the killing of Amulius, and the elevation of Numitor to his rightful authority. The two brothers determined to build a city on the Palatine, and to decide which one should give it his name they resorted to augury. First six vultures appeared to Remus, and then twelve to Romulus. A dispute arising, Romulus came off victor, and began building the city (about 753 B. C.). Remus leaped over the rampart, saying, "Shall such defences as these keep your city?" and was instantly slain by his brother. Romulus opened a place of refuge, and thither many fled from the countries round about; but the neighboring people would not give them their daughters in marriage. Hereupon Romulus announced the celebration of games in honor of Neptune, which were largely attended by the men of the neighboring cities with their families, especially Sabines; while they were looking upon the sports, the Roman youth rushed out and carried off the women to be their wives. In consequence a war arose, first with the people of Cænina, then with the people of Crustumium and Antemnæ, in both of which the Romans were successful; and lastly with the Sabines, who came with a great army under their king Titus Tatius. Through the treason of Tarpeia, the Sabines got possession of the fortress on the hill Saturnius, and a battle ensued in the valley at the foot of the hill. While it was raging fiercely, the women who had been carried off ran down from the Palatine, threw themselves between their husbands and their fathers and

brothers, and prayed them to lay aside their quarrel. A peace was therefore made, and the two peoples became one, the Sabines living on the Saturnius or Capitoline and the Quirinal hills, and the Romans on the Palatine; and the two kings and their counsellors met in the valley between the Palatine and Capitoline hills, which was therefore called *comitium*, "the place of meeting." Tatius not long afterward was slain by the inhabitants of Laurentum, and Romulus reigned over the whole people. These were divided into three tribes: the Ramnenses, from his own name; the Titienses, from that of the Sabine king; and the Luceres, according to some from Lucumo, an Etruscan chief who had aided him in previous wars. Romulus had numerous wars, in which he was very successful. After he had reigned a long time he one day called the people together in the field of Mars. When they had assembled, a terrible storm arose, and in the midst of it Romulus disappeared. That night he showed himself to one Proculus Julius coming from Alba to Rome, and said to him: "Go and tell my people that they weep not for me any more; but bid them to be brave and warlike, and so shall they make my city the greatest on earth." From that the people judged that Romulus had become a god, and a temple was built to him, and he was worshipped under the name of Quirinus. He was succeeded by Numa Pompilius (about 716).

ROMULUS AUGUSTULUS. See WESTERN EMPIRE.

RONCESVALLES, or **Roncesvaux**, a small hamlet in the valley of Valcarlos in Navarre, between Pamplona and St. Jean Pied de Port in France. It commands the entrance to one of the passes of the Pyrenees. Charlemagne, returning from an invasion of Spain, was here attacked by the Basque mountaineers and lost his whole rear guard, A. D. 778. The numerous local ballads and romances of the middle ages, in which are related on one side the exploits of the legendary Spanish hero, Bernardo del Carpio, and on the other those of Roland, Oliver, and the other "peers and paladins" of Charlemagne's court who fell in the encounter, have given a character to the place which history cannot easily remove. (See **ROLAND**.) Through this pass the Black Prince led his army into Spain in 1367; and in July, 1813, Soult was forced from a strong position he had taken here by Wellington. Here Don Carlos was proclaimed king in 1833.

RONDA (anc. *Arunda*), a city of Andalusia, Spain, in the province of Malaga, 86 m. W. S. W. of Granada; pop. about 19,300. It is built upon a high rock, nearly surrounded by the river Guadiaro, which separates the town by a deep chasm, crossed by two bridges, into two parts. Cotton and woollen cloth, cutlery, and other articles are manufactured, and there is an active trade in horses, mules, and especially in crucifixes, which are exported from here to all parts of Spain. The annual fair in May is one of the most animated in Spain. Ronda

is of great antiquity. Under the Moors it was the principal fortress of Granada, and it is still protected by a Moorish castle. In 1485 it was conquered by Spain.

RONDO (It.), in music, a composition consisting of three strains, the first of which, forming the burden, closes in the original key, while the others lead the ear easily and naturally back to it. The piece derives its name from the melody going round through the second and third strains to the first.

RONDOUT. See KINGSTON, N. Y.

RONGE, Johannes, a German priest, born at Bischofswalde, Prussian Silesia, Oct. 16, 1813. He completed his studies at Breslau, and was chaplain at Grottkau from 1840 to 1843; but for refusing to submit to the discipline of the church he was suspended and afterward excommunicated. In 1844 he addressed a letter to Bishop Arnoldi denouncing the exhibition of the holy coat at Treves as idolatrous, and next he called upon the German Catholics to secede from Rome. His agitation led to the formation of the German Catholic denomination, but most of its members in 1862 joined the national Protestant church. (See **GERMAN CATHOLICS**.) In 1847-'9 Ronge was a prominent democrat, and subsequently he was an exile in London till 1861, when he returned to Germany, where for some time he continued active for reform.

RONSARD, Pierre de, a French poet, born near Vendôme, Sept. 11, 1524, died near Tours, Dec. 27, 1585. At the age of ten he entered the service of the duke of Orleans, son of Francis I.; and resuming it after some years' connection with the court of James V. in Scotland, he was employed by the duke in several confidential missions when still a boy. He was subsequently secretary of the French ambassador at the diet of Spire, and of Captain Langey du Bellay in Piedmont. But an illness resulting in deafness detained him in Paris about 1541, and he remained for several years at the college of Coqueret engaged in studies for improving the French language and literature after classical models. His disciple Joachim du Bellay published in 1549 *L'Illustration de la langue françoise*, an exposition of Ronsard's projected improvements. The works of the Pleiad (the name which Ronsard and his six friends, Du Bellay, Baif, Jamin, Belleau, Jodelle, and Pontus de Thiard, gave to their literary association) appeared in rapid succession, and were very popular, excepting with the adherents of the old school. The poems of Ronsard were hailed with enthusiasm, and the title of "the French poet" was bestowed on him. He became the poet laureate, and Charles IX. desired his company in all his travels, bestowing upon him pensions and gratuities. Many complete editions of his works were published from 1567 to 1630. Sainte-Beuve published in 1828 a select edition, with a biographical sketch and comments.—See *Vie de Ronsard*, appended to his *Œuvres inédites*,

by Guillaume Colletet (Paris, 1854), and *Essai sur Mansard et sa réforme littéraire*, by G. Scheffler, Dresden, 1874).

ROOF, the covering of a building. Roofs are very various in form, material, and construction. The rude dwellings of barbarous tribes are usually covered with the branches of trees. In tropical climates, the long and broad leaves of palms serve well for this purpose. In Europe the huts and cottages of the poorer classes are frequently covered with a thick layer of skilfully arranged straw, called thatch, supported by a simple framework. The flat roofs of the dwellings in Palestine and other eastern countries are often made of strong timber and covered with earth; temples and palaces are built of stone and roofed with slabs of marble. Tiles (sheets of earthenware) have been used for coverings of roofs from very early times, and are still extensively employed in Europe. Slate, cut into rectangular shape and nailed upon the boarding which covers the framing of the roof, is much used on the larger classes of dwellings and on public buildings. When the inclination of the roof is sufficient, shingles—flat rectangular pieces of wood, either pine or cedar, varying in thickness from three eighths of an inch at one end to an eighth or less at the other—are generally used on the roofs of wooden buildings throughout the United States. Roofs of slight inclination are frequently covered with sheet tin or sheet zinc. A layer of heavy paper, covered with pitch or with mineral or vegetable tar, is becoming common as a roofing material; this is often protected from the sun and from wear by a coating of gravel. Many other forms of mineral roofing, as asbestos and various complex preparations, have been introduced, and some of them appear to find favor with architects and builders, as being very cheap, readily applied, and moderately durable substitutes for the better known materials. In some cases public buildings, railway stations, and similar edifices, are covered with glass; this was done on the most extensive scale in the so-called "crystal palaces" in which international exhibitions were held in London in 1851, and in New York in 1853.—The inclination of roofs varies from 60 degrees in examples of Gothic architecture, and 25 or 30 degrees in the steeper roofs adopted in climates where snow falls heavily, to 10 degrees in warm climates where exposed to heavy rain, and to a perfectly horizontal position in dry countries. In carpentry, the framing which supports the outside covering is called the roof; this framing is generally of timber, but iron roofs are becoming common, and are now almost universally adopted for buildings of great width, when no support can be conveniently obtained between the side walls. This roof often serves not only to support the exterior covering, but to bind the walls together and sustain the upper floors. The design and construction of such roofs, when of great span,

demands the highest skill of the architect and the builder. When a roof consists of two inclined planes meeting along a line extending over the middle of the building, this junction is called the "ridge," and the end is said to be "gabled." When several inclined planes of roofing meet, forming a pyramid or a frustum of a pyramid, the roof is called a "hip roof." When the roof rises steeply from each side wall, meeting other portions extending with less inclination to the middle line of the building, there forming a ridge, the roof is called a "curb roof," or "gambrel roof." The Mansard consists of a nearly flat roof, extending back from the front of the building, and a second part at the front rising from the wall nearly vertically, permitting the construction of windows, as in the walls of the building. This system of roof construction, introduced by the celebrated architect Mansard, has the advantage also of permitting the upper rooms to be made with vertical side walls, and of giving thus greater capacity, better shape, and superior convenience, while giving at the same time a fine architectural effect which cannot be secured with the ordinary forms of roof. When the Mansard roof is built in wood, it is a source of danger to otherwise comparatively fire-proof buildings. If built, as is now common, in iron, this serious demerit is avoided. The strength of roof framing is determined by the character of the covering, the weight of snow to be expected, the pressure of the wind, and by its own location and inclination. Tin roofing weighs $\frac{3}{4}$ to $1\frac{1}{4}$ lb. per square foot, including the boarding; zinc weighs from $1\frac{1}{4}$ to 2 lbs.; slate from 5 to 10 lbs.; tiles from 6 to 7 lbs. as a minimum, though more usually 10 to 15 lbs.; while exceptionally heavy roofs, covered with flagging, weigh 25 lbs. or more. Snow, when freshly fallen, weighs from 5 to 12 lbs. per cubic foot; if wet, much more. Flat roofs laden with snow, in the United States, are sometimes subjected to a pressure of 50 lbs. per square foot. In Europe an allowance of 6 lbs. is usually made for snow; in the United States 15 or 20 lbs. is thought a better allowance. The pressure of the wind against a flat vertical surface is equal to about 55 lbs. as a maximum per square foot; in a tornado, the velocity being known, the formula for its pressure is very nearly $P = .005V^2$, or $\frac{1}{200}$ of the square of the velocity. P is the pressure in pounds on the square foot. The pressure on a cylindrical tower is half that on a turret of square section, having a thickness equal to the diameter of the tower. On any inclined surface the pressure may be estimated as, according to Hutton, $P = P \sin a^{1.64} \cos a - 1$, where a is the angle made by the surface with the direction of the wind. As it frequently acts wholly on one side of the structure, this is often a serious addition to the load borne. The location of the structure with reference to surrounding objects will modify the allowance to be taken for the pressure of the wind. When building

in exposed situations, as in constructing light-houses, or tall chimneys, or houses in unprotected locations, a large allowance should be made; in the midst of cities, in sheltered valleys, and localities in which heavy gales are unknown, comparatively little attention is given by builders to this force. A usual allowance is 40 lbs. per square foot of vertical surface.—In roof framing, the simplest form

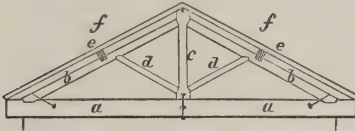


FIG. 1.—King-post Truss.

of truss is that known as the “king-post truss,” consisting of a triangular frame (fig. 1), in which the middle portion of the triangular piece, or tie beam, *a a*, is secured to the junction of the inclined timbers, or main rafters, *b b*, by a vertical post called the “king post,” *c*. Several of these frames are placed parallel with each other to support the roof covering, and are connected by longitudinal pieces called “purlins,” *e e*. Over the latter, and parallel with the main rafters, are the common and lighter rafters, *f f*, distributed at short intervals; upon these the boarding is laid, and over all the slate, tin, or other covering. The

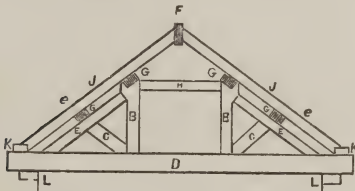


FIG. 2.—Queen-post Truss.

“queen-post truss” (fig. 2) consists of a horizontal tie beam, *D*, and main rafters, *e e*; the latter do not meet, but abut against a horizontal “straining beam,” *H*, which is also held at each end, and at the proper height above the tie beam, by queen posts, *B B*. In Gothic architecture the members of the roof trusses are usually exposed to view from below, and are

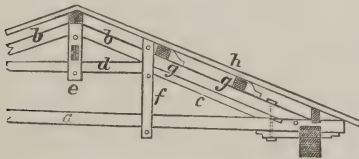


FIG. 3.—Complete Roof.

frequently carved and ornamented. The complete roof is shown in fig. 3, in which *a* is the tie beam, *b b* are the main rafters, *c* is one of two short rafters abutting against the straining beam *d*; *e* and *f* are king and queen posts in

pairs; *g g* are purlins supporting the common rafters, *h*. The tie beam is sometimes omitted, and the thrust of the rafters is received by the side walls, which are often buttressed to enable them to sustain this thrust safely. Roof trusses are often given peculiar forms to suit special designs. The large spans which are sometimes built in wood are often constructed of built arched beams. One of the largest ever designed, but which was never constructed, was planned for the great imperial riding house at Moscow in 1790; this was to have been a single built beam, in the form of an arch of 285 ft. span, with a tie beam and intermediate trusses. A somewhat similar structure has been used in the United States, first by Wernwag and Burr, and in Germany, by Wiebeking, for spans of 200 ft. and upward. In France, Philibert de Lorme first used, and Col. Erny of the army engineers afterward constructed, roof trusses in which planks are bent and built into an arched beam; trusses of this form have been designed for roofs up to 328 ft. span. Built arches of polygonal form are frequently used; where the struts and ties of the trusses, and the points of support for the superstructure, or incumbent load, are properly placed at the angles of the polygon, this is a stronger form than the arched. The roof of Westminster hall, London, somewhat resembles Erny's construction. Domed roofs have been frequently built with similar framing; that of the *halle au blé* at Paris, by De Lorme, was 129 ft. in diameter, and the arched beams were a foot thick. All roofs of large span are now built with iron trusses. One of the earliest iron roofs was that of the British house of parliament; one of its trusses,

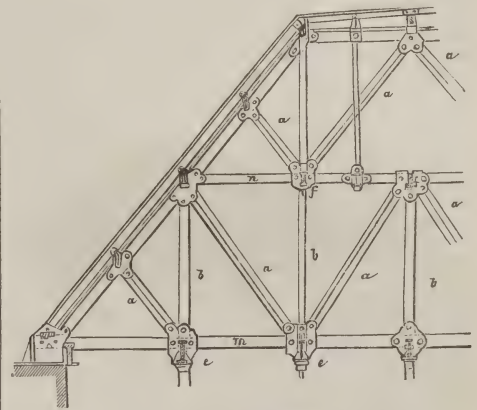


FIG. 4.—Roof of Parliament House.

composed of wrought and cast iron, is shown in fig. 4. The struts, *a a*, are of cast iron; the ties or suspension rods, *b b*, are of wrought iron; *m* and *n* are the chords or tie rods; *e e* and *f f* are stay rods. The roof of the St. Pancras station, of the Midland railway in London, is 690 ft. long, 240 ft. wide, and contains 1,100

tons of iron. The roof of the Grand Central station in New York is 652 ft. long and 200 ft. wide, and consists of 32 wrought-iron trusses, rising in semicircular arches 94 ft. above the rails; the covering is of iron and glass; the trusses weigh 40 tons each; the roof contains 80,000 sq. ft. of glass, and covers nearly three acres.—See Rondelet, *L'Art de bâtir* (Paris, 1812-'17); Ardant, *Etudes sur les charpentes à grande portée* (Paris, 1837); Erny, *Traité de la charpenterie* (Paris, 1840); Ritter, *Dach- und Brückenconstruction* (Hanover, 1869); Unwin, "Iron Bridges and Roofs" (London, 1869); Tredgold, "Carpentry" (3d ed., London, 1870); Matheson, "Bridges and Roof Structures" (London, 1871); Bow, "Economics of Construction in relation to Framed Structures" (London, 1873); Stoney, "Theory of Strains in Girders" (revised ed., London, 1873); D. H. Mahan, "Civil Engineering" (revised ed., New York, 1873); and De Volson Wood, "Bridges and Roofs" (New York, 1873), and "Resistance of Materials" (revised ed., New York, 1875).

ROOK (*corvus frugilegus*, Linn.), a bird of the crow family, about the size, form, and color of the common crow, from which it differs principally in having the base of the bill covered with a rough scabrous skin, whitish in old birds. It is about 20 in. long and 40 in. in alar extent, the bill $2\frac{1}{2}$ in.; the female is a little smaller; the color is black, with purple, greenish, and bluish reflections, the feathers of the neck blended, and on the fore part of the head abraded; the head is entirely feathered in the young; albinos sometimes occur, and the bill is often variously distorted. It is found over most of Europe, and abundantly in many parts of Great Britain. Rooks live in society all the year round, building their nests, seeking food, and roosting in flocks; their resorts, called rookeries, are often very extensive, one near

They are very early risers, going in search of worms in the fields or of garbage in the streets; they sometimes visit the beaches and flats in search of shellfish and crustaceans; they eat also grain, seeds, insects, nuts, and lizards, but rarely if ever carrion; they plunder the grain fields only when forced by hunger; they feed with birds of various families without quarrelling. They prefer open fields, placing a sentinel, and flying off at his alarm note with great noise; the flight is generally by slow and regular flappings, without undulations; they often go many miles in search of food, and if they return in the forenoon or early afternoon, a storm within 24 hours may be confidently expected. They begin to repair their nests early in spring, and lay four or five eggs, light greenish blue, spotted and clouded with grayish brown and light purplish gray; the young are hatched about the middle of April, and leave the nest by May 20; great numbers of the newly fledged birds are annually shot to be eaten. The rook has been taught to imitate the sounds of animals, but is less intelligent and docile than the raven, crow, and jackdaw.

ROOKE, Sir George, an English admiral, born at the family seat near Canterbury in 1650, died there, Jan. 24, 1709. He entered the navy as a volunteer, and was made rear admiral of the red by William III. In the battle off Cape La Hogue, May 19, 1692, between the combined English and Dutch fleets and the French fleet, he led a night attack in the boats of the squadron, and burned six French three-deckers and seven other ships of the line, with a loss of only 10 men. He received a pension of £1,000, and was knighted. He was twice elected to parliament, and on the accession of Queen Anne in 1702 he was constituted "vice admiral and lieutenant of the admiralty of England, as also lieutenant of the fleets and seas." The war of the Spanish succession having begun, he was sent with a fleet against Cadiz, an attack upon which place was made, but abandoned; but receiving intelligence that the Plate fleet, under convoy of a French squadron, had taken shelter in the port of Vigo, in concert with the duke of Ormond he stormed the town, and destroyed 17 ships, capturing specie and goods amounting in value to £1,000,000. In August, 1704, he was conspicuous in the capture of Gibraltar. After a whole day's battle with a large French fleet off Malaga, Aug. 24, which got away in the night, he returned to England and retired from service.

ROOKS, a N. W. county of Kansas, intersected by the S. fork of Solomon river; area, 900 sq. m. It is not included in the census of 1870. The surface is gently rolling, and consists chiefly of prairies.

ROON, Albrecht Theodor von. See supplement.

ROOT, in botany. See PLANT, vol. xiii., p. 576.

ROOT, in mathematics, a term used in two different though related senses. I. In arithmetic a root is the inverse of a power; thus 16 is the fourth power of 2, and 2 is the fourth



Rook (*Corvus frugilegus*).

Edinburgh in 1847 containing 2,660 nests and about 30,000 inhabitants of all ages. The nests are made on tall trees, often in the midst of populous towns, and the same are used year after year; they are fond of the groves of old family mansions, where they are protected.

root of 16; 9 is the second power, or, as it is usually called, the square of 3, and 3 is the second or square root of 9. It will thus be seen that a root of a given number is a number which being taken a certain number of times as a factor will produce the given number. An arithmetical root of a number is indicated by the sign $\sqrt{}$ with the number placed after it, and the number indicating the degree of the root placed above and before it; thus $\sqrt[4]{16}$ is read "the fourth root of 16." The sign is a modification of the letter r , which was formerly used for this purpose. The second or square root is indicated by the sign alone, the figure 2 being omitted; thus $\sqrt{9}$ means the same as $\sqrt[2]{9}$. The first root of a number is the number itself, and therefore needs no sign. In the best modern works on algebra the sign $\sqrt{}$ is strictly limited to the designation of the arithmetical root of a quantity. II. In algebra the term root is used to denote any value of the unknown quantity in an equation, which being substituted for that quantity will satisfy the equation; thus the equation $x^4 - 7x^3 + 27x^2 - 47x + 26 = 0$ can be satisfied by substituting for x any one of four different values, two of which are real, viz., 1 and 2, and two are imaginary, viz. $(2 + 3\sqrt{-1})$ and $(2 - 3\sqrt{-1})$. Any given number has only one arithmetical root of a given degree, but it has as many algebraical roots as there are units in the number denoting the degree of the root; thus 3 is the only arithmetical square root of 9, but algebraically 9 has two square roots, $+3$ and -3 , because either of these will satisfy the equation $x^2 = 9$. The arithmetical root is at the same time one of the algebraical roots. Algebraical roots are designated by means of fractional exponents (see EXPONENT); thus $9^{\frac{1}{2}}$ may be considered as representing either $+3$ or -3 , and $1^{\frac{1}{2}}$ means either 1 (its arithmetical value) or -1 or $\sqrt{-1}$ or $-\sqrt{-1}$, either of which will satisfy the equation $x^4 = 1$. When the numerator of the fractional exponent is some number other than 1, it indicates that the root expressed by the denominator is to be raised to the power expressed by the numerator; thus $a^{\frac{2}{3}}$ means the third power of any one of the five fifth roots of a .

ROPE, a large cord, formed by twisting together a collection of vegetable or animal fibres or metallic wires. The smaller cords are called twines and lines, and all are included under the general name of cordage. The invention of ropes or cordage dates from the earliest times. The first ropes were probably made of the fibres of the inner bark of some kinds of trees or of grasses, and of thongs from the hides of animals. There are sculptures among the relics of the ancient Egyptians illustrating the manner of making ropes more than 4,000 years ago, and their most ancient records contain representations of well made ropes capable of transmitting the enormous power required in transporting their

colossal statues and huge blocks of stone. It appears that they made use of flax, and also of the fibres of the date tree. The most celebrated ropes known to history are the cables used in the construction of the bridges of boats on which the army of Xerxes crossed the Hellespont (Herodotus, vii. 36). There were two bridges, and six cables were assigned to each bridge. Two of the cables were of white flax, while four were of papyrus. Both sets of cables were of the same size and quality, but the flaxen were the heavier, weighing not less than a talent the cubit. If we assume the talent to be equal to about 56 lbs. and the cubit to be 22 in., the cables must have measured about 28 in. in circumference. The largest hemp cables ever made in the United States were 24 in. in circumference. The ancient Peruvians twisted together the strong fibres of the magney plant, forming them into cables as large as a man's body, used in the construction of the suspension bridges by which their paved highways were carried over ravines and rivers. Many rude savages, especially among the islands of the Pacific and Indian oceans, are celebrated for making beautiful cordage. In modern times, among civilized nations, the principal materials for ropes are hemp, flax, manila hemp, plantain leaf, jute, and metallic wire. Rope making was regarded as a matter of great importance to the early American colonists, and efforts were made to introduce it with other branches of manufacture in Virginia, where the climate and soil were found to be favorable to the cultivation of hemp and flax; but the culture was neglected for that of tobacco. In New England it was regarded with more interest; crops were raised from seeds of the plant received in Salem in 1629, and in 1641 the general court of Massachusetts directed attention to the wild hemp which grew in the province, and was used by the Indians for making nets, mats, and lines. In the same year the manufacture of cordage was begun in Boston by John Harrison, and in 1662 in Charlestown by John Heyman. In Connecticut the government at Hartford in 1642 gave direction for the sowing of hemp and "for the better furnishing of the river with cordage toward the rigging of ships." In the "History of Pennsylvania and West New Jersey," by Gabriel Thomas (London, 1698), there is a notice of large ropewalks in Philadelphia, several of which were owned by Joseph Wilcox.—*Rope Making*. In the United States there are four principal kinds of rope in common use: hemp rope, made of the fibres of the *cannabis sativa* or hemp plant; manila rope, made of the fibres obtained from the leaves of the *musa textilis*, or wild plantain; hide rope, made of long strips of green ox-hide; and wire rope. The best hemp for rope making comes from Russia, the Riga Rein being the brand preferred. One reason assigned for the superior quality of Russian hemp is the

practice of water-rotting it. American hemp is dew-rotted. Manila hemp comes chiefly from the Philippine islands, taking its name from Manila, the principal town. The best brand is the Cebu, named from the island on which it is grown; Quilot is another good brand; the Leyte is of inferior quality, while Lupis is very fine, white and silky, and of too high a grade for rope making. Hemp purchased for government use is first tested by inspection. It should present a fair appearance to the eye, be clear, dry, and free from a musty smell. If the appearance is satisfactory, a sample is selected at random from the cargo or lot and sent to the ropewalk to be more thoroughly examined. A lot containing about 140 lbs. is given to the hackler, and divided into two parts of 70 lbs. each. One part is hackled sufficiently fine for the smallest yarn or that used for bolt rope; the other part for larger yarn or the size used for cables. After hackling the hemp is again weighed to ascertain the quantity of dressed hemp produced and the percentage of tow and waste taken from it; this should not exceed 20 per cent. The dressed hemp is then passed through the spreaders and drawing machine and taken to the spinners, where it is spun into yarns of 20 s. and 40 s. The yarns are then weighed to ascertain the waste in spinning and the quantity of yarn produced. Half of the yarn is taken to the "laying" ground, where it is laid up into rope $1\frac{1}{2}$ in. in circumference. The other half is first tarred and then laid up into ropes of each sized yarn, making in all four ropes: tarred and untarred of 20 s., tarred and untarred of 40 s. The ropes are then carefully weighed to ascertain the weight per fathom and the percentage of tar absorbed. The strength of the rope is then found by securing short pieces, cut in lengths of 6 ft. for convenience, in a testing machine. The dry or white rope should sustain a strain of 4,200 lbs.; the tarred, 3,200 lbs. The weight should be from .5 to .6 of a pound per fathom for the dry, and from .6 to .7 for the tarred. The hemp having passed the required inspection, the first step in the process of preparing it for the manufacture of rope is to hackle or hatchel it. The hackle or hatchel consists of a strong board in which are inserted long steel prongs sharply pointed and polished. The hackler, taking a wisp of hemp in his hand by one end, throws the other over the prongs and combs it out, cleaning it of dirt and tow and straightening out the fibres. Having combed it out to where it was held, he reverses the wisp and combs out the other end. Much of the tow that is thus combed out is again hackled and spun into yarn for inferior kinds of rope. After hackling, the hemp is passed through the spreading and drawing machines, care being taken to regulate the supply so that the "sliver" or "roping" for the spinning machines shall be of suitable size; if too small, the yarn is liable to break in spinning; if too large, the spinning machine will clog up. The first

of the "preparation machines" is the "spreader," which is in fact a finer method of hackling. Its office is to comb out and straighten the fibres. The largest one now in use at the government ropewalk is intended especially for the very long manila fibres, being 17 ft. long by 6 ft. wide. It will run off a bale of 270 lbs. of manila in nine minutes, or 60 bales in 10 working hours, taking it direct from the bale, or rather with the intermediate step of oiling. From this machine the manila passes to a smaller and finer one, where the fibres in the sliver are still further straightened, and the sliver itself evened and drawn down. Thence it passes to a third, called the drawing frame, a machine built on precisely the same principle, but with one chain instead of two and with finer teeth, through which it is usual to pass it twice, the sliver at each successive step being reduced in volume, straightened and evened more thoroughly, to prepare it for the spinners. The course of preparation for the hemp is the same, though if the machines are properly geared and the draught correct, it will be found sufficient to run the hemp through the spreader only once, and through the drawing frame twice. From the preparation machines the hemp passes to the spinner, where it is spun into yarn and at the same time wound on a bobbin containing about 300 fathoms. In making rope, a three-inch rope is the key to the sizing of the yarn. Yarns of 20 s. are of such a size as to require 20 to make one strand for a three-inch rope, or to fill a tube half an inch in diameter; yarns of 26 s. require 26 threads to fill the same sized tube, and so on. If manila or white rope is to be made, the bobbins pass from the spinning room to the laying ground; if tarred rope, the next step is tarring. The bobbins containing the yarn are taken from the spinners to the tar house, where they are placed on horizontal rods contained in a framework conveniently arranged with reference to the tar box; 160 bobbins is about the capacity of the frame. The end of each yarn is passed through a board or gauge perforated with holes sufficiently large to allow the yarns to run freely, thence through three or more similar gauges so arranged over the tar box that when all is ready they can be lowered to the bottom. The tar box should be about 30 ft. long, 2 ft. wide, and 3 ft. deep. Steam, admitted to copper steam pipes at the bottom, keeps the tar at the desired temperature. A thermometer is so arranged that the bulb is always immersed in the tar, which, after the evaporation of the watery parts, should be maintained at 220° F., and should never be allowed to get below 212° while tarring. The machinery is so regulated that the yarn is drawn through the tar at the rate of about 15 ft. a minute. After leaving the tar the yarn passes between two metal rollers attached to the further end of the box, the upper one carrying a heavy weight to press out the superfluous tar. Thence the yarn passes

over a drum to cool it, when each separate yarn is led to, and evenly wound upon, its appropriate bobbin. After tarring, the yarn should before use be allowed a few hours to harden, and attach more closely to the fibre. Should it be made into rope immediately after tarring, the tar would press through to the surface, giving it an unsightly appearance, and decay would soon set in at the centre of the rope. The passing of the yarn through the boiling hot tar at a certain rate is necessary to enable it to take up a sufficient quantity of tar, the rollers pressing out and returning to the trough the superfluity. Enough of the tar is retained in the yarn to coat over the fibre and preserve it from decay. Tarring protects cordage from injury by exposure to rain and immersion in water; but it makes its fibre rigid and impairs its strength. This fact has long been known, and many efforts have been made, hitherto unsuccessful, to improve the tar or find a substitute for it. It has been shown by experiment: 1, that white cordage in continual service is one third more durable than tarred; 2, that it retains its strength much longer when kept in store; 3, that it resists the ordinary injuries of the weather one fourth longer. Manila is judged by inspection, and is not tested by strain. It is neither hackled nor tarred, with the single exception of the case of outside yarns of large hawsers, which are tarred. Having a harsher fibre, it is oiled before running through the preparation machines, the oil softening the fibre and relieving the machinery of much of the work it would otherwise have to perform. Care must be exercised, however, not to use too much oil, lest the manila turn yellow and the yarn become gummy. It should be well prepared before being taken to the spinners, as all the work required of them should be to put the twist into the yarn and wind it on the bobbin. The yarn having been spun of the size desired and wound up on bobbins, it is taken to the laying ground, where each bobbin is placed on an iron rod in frames convenient for reeling off in the process of forming the strands. The frames hold from 200 to 300 bobbins, one, two, or three frames being used, according to the size of the rope to be made. The number of yarns required for a strand are passed each through its proper hole in a metallic plate, brought together through a closely fitting iron tube in the tube board, and attached to the proper hook in the "former," a machine so called because it forms and equalizes the twist of the strand. The holes in the plate are made on concentric circles. The tube inserted in the tube board opposite the centre of the plate is so made as to compress the yarns of each strand into a solid mass as they are drawn through and twisted into a strand. Each strand has a separate plate and tube. The "former" is drawn down the ropewalk by steam power, and is so constructed with "whelps" on drums, and gears, that at whatever rate it may travel the

proper rotary motion is always given to the spindle to twist the yarns into strands. Power is applied to the former by means of an endless rope passing from one end of the walk to the other. The tube board is heated during cold weather by steam pipes, thus warming the tubes and keeping the tarred yarns soft and pliable. The next step is to put the strands into a rope, termed "closing." Two machines are used for this purpose, one at each end of the walk. The one at the lower end is termed a layer, as it lays up or closes the rope. The upper machine is stationary, and is used to keep the proper twist in the strand while laying. The strands are attached to the hooks of the machines separately. The machines being put in motion, the strands are brought to a proper degree of tension by means of a press attached to the lower or laying machine. As the turn or twist is put into the strands they shorten in length; this is termed "hardening." After the strands become hard, they are placed on one hook of the laying machine, but kept separate in front by the insertion of the "top," a wooden cone with grooves cut in its surface of a size to admit the strands. The top has attached to it "rope tails," which are applied to the rope during the process of closing for the purpose of creating friction. The more turns taken with the tails, the more twist is given the rope, and consequently the harder it becomes. The machines are so geared that the lower one makes two revolutions to one of the upper; that is to say, it requires two revolutions of the rope to one of the strands, the additional revolution being requisite to overcome the friction caused by the top, tails, and stake heads, which are placed at every five fathoms to support the strands and the rope. To obviate the necessity for long ropewalks, a machine has been devised for reeling up the rope as it is made. In private establishments rope is made on these layers as large as 10-inch. They are known as "Woodworth's laying machines." The government ropewalk, in Boston, Mass., is 1,360 ft. long. Rope can be made there, without resorting to unusual means, 170 fathoms (1,020 ft.) in length.—*The Quality of Rope.* The strength of rope depends mainly upon the quality of the material of which it is made. Hemp fibres vary from 3 to 3½ ft. in length; the manila averages over 6 ft., and is often found as long as 12 ft. To make rope, these fibres must be overlapped among themselves, and compressed so as not to be drawn apart. This compression is obtained by twisting, the fibres being continuously drawn out from a bundle in quantities sufficient to produce the thread or yarn, as already described. It is customary to spin the yarn right-handed. Yarns are then combined by twisting, and form a strand which becomes left-handed, the twist being reversed at each successive step. Three or more strands are then combined by twisting, forming a rope, which in its turn becomes right-handed; and

three or more ropes twisted together form a left-handed cable of nine strands. The proper twist to give the yarn averages about one turn and a half to the inch. The degree of twist to the rope may be determined by constructing a right-angled triangle, the base of which is the circumference and the height the length of one turn of the strand measured parallel to the axis. The difference between this height and the hypotenuse is the quantity by which the rope is twisted. The rope maker's rule for a three-strand rope is to have one turn to as many inches as are contained in the circumference of the rope. A three-inch rope, for example, should have one turn in three inches, measured on a line parallel to its axis. Three-stranded right-hand rope is commonly called plain laid. Four-stranded rope is made with a smaller rope in its centre, called a heart. If in making a rope the twist of the strands, instead of being reversed, is made the same as the yarn, right-handed, then the rope itself becomes left-handed, commonly called back-handed rope. It is more pliable but not as strong as the plain laid. The continual twisting necessary to bind the fibres into a permanent bundle "shortens in" its length. Plain-laid rope takes up 46 fathoms of the original yarn for every 100 fathoms of rope. It requires 2,488·8 lbs. of hemp to produce one ton of rope of 20-thread yarn, or about 11 per cent. more hemp than yarn. The size of rope is designated by its circumference; thus a six-inch rope measures six inches in circumference.—*The Strength of Rope.* The utmost strength of good hemp rope was formerly supposed to be about 6,400 lbs. to the square inch; but 9,200 lbs. is nearer the average strength. Tarred hemp ropes of $3\frac{1}{2}$ and 3 in., made at the government ropewalk, on a trial, required respectively a strain of 14,622 and 10,725 lbs. to break them, and therefore their utmost strength per square inch was 15,000 and 14,975 lbs., considerably more than double the strength ordinarily assigned to good hemp rope. These ropes were not made expressly for the trial. Rope stretches from one seventh to one fifth, and its diameter is diminished from one seventh to one fourth before breaking. A rough but safe rule for finding the breaking strain in tons of plain-laid rope is to square half the circumference. Thus, in a six-inch rope, the square of three is equal to nine tons, the table giving ten. A fore-handed rope is 25 per cent. stronger than one laid back-handed. A plain-laid rope is stronger than a cable-laid by about one sixth, owing to its having less twist. Four-stranded rope is weaker than three, about one thirteenth of its yarns going into heart. The heart forms the centre round which the strands circle. On applying a breaking strain, the heart breaks first, when an unequal strain is brought on the strands, and they part in detail. The strength of manila rope is about one third less than that made of hemp. Repeated experiments show that there is a great varia-

tion in the strength of rope cut from the same coil, amounting sometimes in large ropes to several hundred pounds.—*Hide Rope* is made of strips of green oxhide. The hide is stretched on frames, and when partially dry is placed on a revolving table, the ragged edges stripped off, and the entire hide cut into one yarn or strip by a knife placed for the purpose, the table and knife being worked by machinery. Two or more strips are united by a rope yarn. These strips are then reeled upon bobbins placed in the frames on the laying ground, and without giving any twist to the hide yarn they are laid up into strands, &c., just as in making hemp rope.—*Wire Rope.* The best charcoal iron wire or steel is used. The first step in the process of manufacture is to wind the wires on bobbins, the ends of separate pieces of wire being joined by brazing or twisting. Having seven bobbins filled, six are put in a small machine, and one in a reel stand conveniently situated for leading the wire down through a fair leader and thence up through the vertical shaft; this single wire is for the heart, around which are wrapped the six wires placed on the horizontal disk. As the disk revolves the six bobbins turn on their own centres in an opposite direction, so as to avoid twisting the wires. The proper tension on the wire is maintained by friction bands attached to the bobbins. The six wires with the single wire in the centre are for the heart of the strands. Having formed the heart (which is wound up on a bobbin as it is made), it is placed in a reel stand as before. On the machine to form the strand are twelve bobbins filled with wire; the machinery is put in motion, the seven-wire heart drawn up the vertical shaft, and the twelve wires wrapped about it. As the strand is formed it is wound up on a bobbin, which at each successive step increases in size. When the required length of strand is on the bobbin, known by a register fitted for the purpose, the machinery is stopped, the strand cut, the full bobbin removed, and an empty one put in its place. When seven bobbins are filled with strands, six are placed on another machine, a bobbin containing the heart being placed in the rear; the machinery is put in motion, the heart drawn through, and the six strands wrapped about it. The six strands of 19 wires each contain 114 wires, to which the 19 wires in the heart must be added, giving 133 wires to a rope. There are six wire-rope machines, made by Jackson and Watkins, London, and now in operation in the government ropewalk, known as A, the largest, B, C, D, E, and F, the smallest. A and B



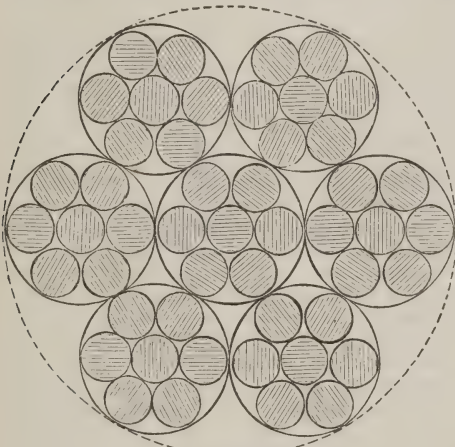
Wire Rope with Hemp Heart.

machines are for forming the rope, and are placed in a horizontal position; the others are for making strands and hearts, and are vertical. Wire hearts are used for bridge cables, &c. Hemp hearts are used instead of wire for standing rigging, as it makes the rope more pliable. The amount of twist to give to the strand and to the rope itself varies with the size, and requires much care and judgment on the part of the manufacturer. The numbers assigned to the various sizes of wires run from No. 22, the smallest, to No. 0, the largest. The heart of the strand must be of the same size as the single wire, and the heart of the rope the size of a strand. The softer hemp permits the inside wires to become imbedded, as in the preceding figure. The foregoing description of wire-rope making applies to the fine wire of 133 to a rope. A stiffer kind of rope is made of coarser wire having seven to a strand and 49 to the rope. The sizing of the wire will be understood from the annexed diagram. Wire rope is applicable to all the general purposes of ordinary rope, except running rigging on board ship, and has many advantages over that

a distance in place of belting, and for all other purposes of this kind, where safety, durability, and economy are necessary, wire rope is far superior. Wire rope must not be coiled or uncoiled like hemp rope. When mounted on a reel, the latter should be turned on a spindle to pay off the rope. When in a coil without reel, roll it over the ground like a wheel, and run off the rope in that way. All untwisting or kinking must be avoided. To preserve wire rope, apply raw linseed oil with a piece of sheepskin, wool inside, or mix the oil with equal parts of Spanish brown or lampblack. To preserve wire rope under water or under ground, take mineral or vegetable tar, add a bushel of fresh slacked lime to a barrel of tar (to neutralize the acid), and boil it well, then saturate the rope with the boiling tar. The grooves of cast-iron pulleys and sheaves should be filled with well seasoned blocks of hard wood, set on end, to be renewed when worn out; this end wood will save the rope and increase adhesion. The small pulleys or rollers which support the ropes on inclined planes should be constructed on the same plan. Steel wire is to a certain extent taking the place of iron wire in ropes, where it is a special object to combine lightness and strength.

ROQUEPLAN, Joseph Étienne Camille, a French painter, born at Mallemort, near Arles, in 1803, died in Paris, Sept. 29, 1855. He became known in 1827 by his illustrations of Sir Walter Scott's romances. In 1853 his "Amateur Antiquary," painted in 1834, brought 30,000 francs. His latest and best painting was "The Well near the tall Fig Tree" (1852).

RORIC FIGURES (Lat. *ros*, dew), a name applied to certain curious images rendered manifest upon breathing on polished solid surfaces, when these have been previously exposed to contact with or close proximity of the objects thus represented, and usually at the same time acted upon by light, heat, or electricity. The singularity of these phenomena is, that they consist usually in the production at the first of a sort of latent or invisible image, which may afterward be developed somewhat in the manner of photography. Dr. J. W. Draper, in the "Philosophical Magazine" for September, 1840, mentioned certain facts going to show that an insensible molecular change may be made to take place in the surface of bodies; and among them he named the following instance, as long known: "That if a piece of very cold clear glass, or, what is better, a cold polished metallic reflector, has a little object, such as a piece of metal, laid on it, and the surface be breathed over once, the object being then carefully removed, as often as you breathe on it again, a spectral image of it [the object] may be seen; and this phenomenon may be exhibited for many days after the first trial is made." Möser of Königsberg first distinctly called attention to these figures; his statement through M. Regnault to the French academy in July, 1842, being to the effect that generally,



Wire Rope with Wire Heart.

made of hemp or hide. Its first cost is less than that of hemp rope of equal strength, the only correct mode of comparison; and, as a general rule, it will last three times longer than hemp rope. Its utility and economy have been fully demonstrated on inclined planes and slopes, to which purposes its application has become very general, and for hoisting, in warehouses, machine shops, foundries, mines, &c. It has also been substituted with perfect success for staying or guying derricks, suspension bridges, cranes, shears, masts, chimneys, &c., and for these purposes, not being affected by the weather, it never requires resetting, saving thereby a large amount of labor. For ferries, tow lines, tiller ropes, suspending gasometers, lightning conductors on vessels or houses, hauling logs in saw mills, for transmitting power to

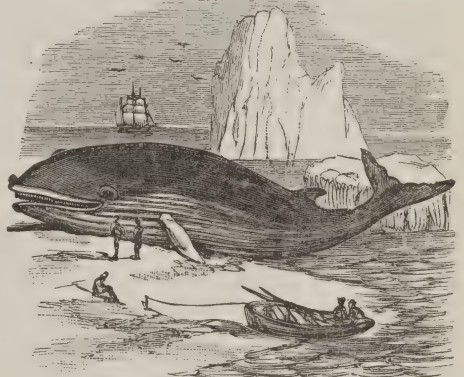
when two bodies are sufficiently near, they impress their images upon each other; or, as he elsewhere says, if a surface has been touched in any parts by any body, it acquires the property of precipitating all vapors, these adhering to or combining with it on those spots differently from what they do on others. Möser inferred from the facts that there is a latent light, as well as latent heat; and that bodies radiate such a light, even in complete darkness. Write with a dry, blunt wooden point, a coil of paper, a brush, or any solid that does not scratch or color, on a clean surface of glass, or on any polished solid; no visible trace may appear; but breathe on the surface, and the parts that were touched will alone condense the breath, or they will condense it much more completely than, or differently from, other parts, and the characters traced become visible in lines of moisture. Or, breathe upon a surface, trace upon, and then dry it; breathing upon it again, the figures will reappear. To these appearances the name of Möser's images has been given; while some German writers term them *Hauchfiguren*, breath figures; and Mr. Grove has designated them as "molecular impressions," a name truly expressing the nature of only a limited proportion of the cases. Place a coin on a clean looking-glass, and leave both for some time in the sun; removing, and breathing gently on the glass, a quite distinct image of the coin will appear. Mr. R. Hunt produces similar effects by heat; and he ascribes the phenomena directly to thermic agency, though he seems to claim also (what more recent investigators deny the necessity of) a galvanic influence, his results being best when the metals used were electrical opposites, and as the impressing object was larger. He placed on a well polished copper plate, too hot to be handled, coins and medals of gold, silver, bronze, and copper, and allowed the whole to cool; removing the objects, exposing the plate to the vapor of mercury, and wiping off any non-adherent mercury, he found that the coins had made impressions on the surface that were distinct in the order above given, those of the gold and silver most so; and these were permanent. Whatever in cases of this kind the change may be, the parts of any device affect the surface to which they are near according to the relative proximity of the projecting and depressed portions. By exposure over night he obtained a very distinct image of the grain of wood placed at more than half an inch distance from the receiving plate; and so, images are readily obtained with objects an eighth of an inch from the surface; a very good plan is, with the object on or hung near the plate, to place both on the mantelpiece over a fire, the ascending heat radiations being thrown back from the object, and affecting the polished body. (See the chapter on "Thermography" in R. Hunt's "Photography," republished in New York, 1852.) Karsten placed a medal on a glass plate, resting on one of metal (a coin on a look-

ing-glass coated with amalgam may be used), and allowed a few sparks from an electrical machine to fall on the medal; the image on the glass is brought out by vapor of mercury, iodine, or the breath. Some years before, Riess discharged electric sparks on glass and mica plates, and, breathing on these, brought out figures of the traces of the spark. But if he first cleaned the glass by boiling in nitric acid and washing in ammonia, or employed platinum foil clean enough to fire gases, or fresh mica surfaces obtained by splitting for the occasion, no figures appeared after applying the electric spark. Karsten concludes that surfaces show figures after the electric discharges only when they have previously become "weathered" over with minute depositions of fatty and other organic matters; the spark burning these off along certain lines, which then behave differently from the other parts to moisture and to light. This doubtless explains some of the figures due to electricity, as does the supposition of Fizeau some of those occasioned by heat. The latter considers that most surfaces are slightly coated with fatty or organic matters, and that during proximity these are transferred in minute quantity to the receiving surfaces. It is known that mercurial vapor condenses in a manner visibly different on a surface already soiled or exposed to vapor, however slightly. But there are instances that appear to be covered by neither of these suppositions, and which can only be explained by some actual change in the molecular constitution of bodies, affecting their subsequent behavior toward the physical forces. If we modify Karsten's experiment by placing eight or ten plates beneath the coin, and afterward mercurialize the upper surfaces of all the plates, the figures appear upon them all, but more faintly as the surfaces were further removed. Electrical discharges render evident impressions long apparently obliterated by polishing, thus showing that these could not have been superficial merely. The surfaces may be impressed in the dark, and without known change of temperature. Near a polished silver plate fix one of glass, painted black, with characters scratched through this coating, and expose to the sun for some days; or place a lattice-work before polished granite in the sun for half an hour; in either case the images can be afterward developed. The electric images are not easily obliterated by ordinary means of washing and rubbing. Mr. Hunt, observing that black substances in case of heat leave the strongest impressions, applied this fact, in an art which he named thermography, to the copying of prints, cuts, writing, &c., the impression obtained on amalgamated copper being treated with mercury to develop the light, and with iodine for the dark spaces. The art in this form has not been practically introduced. Breguet, the celebrated Parisian watchmaker, found inscriptions on the inner case of a watch reproduced on the

inner surface of the outer case; and engineers observe examples in which the near surfaces of parts of machines become visibly impressed the one on the other. Without doubt these are instances of mere transfer of material; and a sort of printing, due to such transfer during long contact, is obviously the explanation of such cases as those of the images which picture framers find impressed on glass or paper with which a print has been long in contiguity. Photographic negatives or positives sometimes produce latent impressions on paper, or through it on sensitive surfaces with which they are laid away; and a sensitized plate from which one picture had been apparently discharged, receiving a second, has had the two pictures then developed on the same field. These and similar phenomena must be explained on simply chemical principles. Mr. C. A. Seely of New York has observed that a sheet of sensitive paper, having been enclosed between several folds of a printed circular, and left within a book, of course in the dark, for about a week, impressions became visible on both sides of the sheet, and the printing on both sides of two or more folds of the circular became superposed on the sensitive paper, that of more distant folds being sometimes the more distinct, and usually not on their own, but on the opposite side of the sensitive sheet. Mr. Grove observed peculiar spots on some trout, and placing freshly caught fish with a serrated leaf on each side in the sun, found that, after a while, that on the sunned side had impressed its image on the skin of the fish, while that in the dark had not. Grove experimented also by placing paper with letters cut in it between glass plates, making these with sheets of tin foil into a Leyden apparatus, and electrifying for a few seconds with a Ruhmkorff coil; he then breathed on the inner surfaces of the glass, and images of the letters appeared; or by exposure to hydrofluoric acid, these were permanently etched. Pouring over a plate holding this latent image a film of iodized collodion, treating as for a photograph, and exposing to diffused daylight, another image, also insensible, was by the consequent action on light induced in the collodion film; and this being dried, removed, and submitted to developing agents, the insensible molecular change by which characters were impressed on the glass by electricity was finally rendered manifest by visibility of the image in the film. The number and variety of the ways known in which the luminous, actinic, and thermal rays, as well as electric perturbation and discharge, are capable of modifying the condition, and doubtless the molecular constitution of bodies, have been since the time of the announcements by Draper and Möser continually on the increase; until we are at length led to admit that many or all of these agents must modify molecularly all bodies subjected to their influence, and in turn their subsequent behavior to many of the physical forces. (See

FLUORESCENCE, PHOSPHORESCENCE, and PHOTOGRAPHY.) Finally, it appears no longer necessary, with Möser, to ascribe these actions to latent light; nor with Herschel, to claim a peculiar heat or set of "parathermic rays."

RORQUAL, the largest of the whale family, distinguished from the Greenland or right whale (*Balæna mysticetus*, Linn.) by the presence of a dorsal fin, and by nearly parallel longitudinal folds extending between the arches of the lower jaw, from the under lip along the chest and abdomen. The name rorqual is of Norwegian origin, meaning "whale with folds;" the genus was named *balænoptera* by Lacépède in 1804; the whalers give to it the names of razorback and finback. There are no teeth, and the baleen or whalebone is very short. The largest species is the great northern rorqual (*B. [physalus] boöps*, Flem.), probably the most bulky and powerful of living animals. The head is about one fourth the length of the body, which is longer, more slender, and less cylindrical than in the right whale; the blubber is much thinner, rarely exceeding 6 in., and usually yields less than



Great Northern Rorqual (*Balænoptera boöps*).

10 barrels of oil, on which account, and also because the baleen is of comparatively little value, whalers do not often attack this bold, restless, and powerful inhabitant of the ocean. The head is so flat that the longest baleen plates seldom measure 4 ft.; there are many hundred plates, becoming toward the sides mere bristles; the posterior arch of the palate is large enough to admit a man, though the opening of the œsophagus would not allow anything larger than a cod to pass; the sieve is coarser and the swallow larger than in the right whale, indicating a totally different kind of food, the rorqual devouring not only medusæ and crustaceans, but immense numbers of herring, pilchards, salmon, haddock, and cod; Desmoulins says that 600 good-sized cod, and a great quantity of pilchards, have been found in the stomach of a single individual. The longitudinal folds of the under surface

vary in width from $\frac{1}{2}$ in. to 3 in., and allow of the distention necessary to hold the water containing its prey, which is strained through the baleen during the shutting of the mouth; the tongue is free at the apex. The rorqual attains a length of 100 to 110 ft.; the body is compressed on the sides and angular on the back; the head comparatively small, and the tail narrower than in the right whale; the lower jaw is longer and much wider than the upper; there is a small dorsal opposite the vent; the pectorals are distant from the angle of the mouth, slender, straight, and pointed. The color is dark bluish gray, lighter below, the lower lip and the folds rosy white. They blow so violently as to be heard a great distance in calm weather; when seen, they are almost always in motion, and when about to descend do not throw the tail high in the air. They are abundant in the arctic seas, especially on the coast of Spitzbergen, as far as lat. 80° N. in open summer weather; they generally avoid much ice, and are shunned by the right whale, and their appearance is consequently unfavorable to the whalers' success. The usual rate of swimming is about 12 m. an hour; they are bold, but not revengeful or mischievous, though like other whales they will often attack and destroy a boat when their mates or young are wounded. The Greenlanders sometimes take small specimens by following in their canoes, and throwing so many lances that the animal dies from loss of blood; they are also occasionally stranded in their pursuit of herring and other fish into shallow water on a retreating tide. In a skeleton 78 ft. long, the head was 21 ft., and the vertebral column 57 ft.; there were 7 cervicals and 13 dorsals, the longest rib (the 6th) 11 ft. long; the bodies of the larger vertebræ were 14 in. in diameter, and 6 to 7 ft. from tip to tip of the transverse processes; the skull in some parts had a vertical thickness of more than 3 ft. In a female 95 ft. long, the head was 22 ft. and the lower jaw 25 ft. long, and the weight of the skeleton 35 tons. This, with the Mediterranean rorqual (mentioned below) and other species, Gray places in a distinct genus *physalus*, though without very satisfactory generic characters. The lesser rorqual, considered by Bell as the young of the greater, was made into a separate species by Dr. Knox with the specific name of *minor*, and is the *B. rostrata* (Gray). It attains a length of 25 ft., and has 15 fewer vertebræ than the preceding species; the baleen is short and white, the folds of the throat rosy, and the upper part of the base of the pectoral is marked with a white spot. It frequents the rocky bays of Greenland and the coasts of Norway and Iceland, sometimes descending to lower latitudes; it feeds on the arctic salmon and other fish; it is very active and rarely attacked, though its flesh is highly estimated in northern climates; the oil is also very delicate, and forms an important article of Icelandic materia medica.—

The rorqual of the southern seas, or black whale of the South Pacific (*B. australis*, Cuv.), has a long dorsal immediately over the pectorals; it is black above, white beneath, and the folds roseous; the vertebræ are 52 in all. It rarely approaches the cape coasts, and from its strength, velocity, and small yield of oil is not considered worth pursuing; it attains a length of 40 ft.; it can leap entirely out of water, and is fond of floating perpendicularly, with only the head above the surface. The rorqual of the Mediterranean (*B. antiquorum*, Fisch.) is probably the one called *mysticetus* by Aristotle, and *musculus* by Pliny. Some of this species have been stranded on the southern coasts of France, 60 to 80 ft. in length; the color is grayish black above, lower jaw and folds rosy, rest of lower parts white. Two specimens of rorqual have been obtained within a few years on the New England coasts, and the skeleton of one 50 ft. long is in the collection of the Boston society of natural history. Other species are described. Some small species have been found fossil in the pliocene of Piedmont, far from and high above the present level of the sea. M. Cortesi discovered two species, named by Desmoulins *B. Cuvieri* and *B. Cortesii*, respectively 21 and 12 ft. long.

ROSA, *Euphrosyne Parepa*, an English soprano singer, born in Edinburgh in 1836, died in London, Jan. 21, 1874. Her father was Georgiades de Boyescu, a Wallachian nobleman; her mother was Elizabeth Seguin. The latter, left a widow at the age of 21, adopted music as a profession, and trained her daughter for it. She studied under Crescentini, Panseron, and Bordogni, and made her début at Malta in 1855 as Amina in *La sonnambula*, adopting the stage name of Parepa. After singing in many cities of southern Europe, in 1857 she went to London, where she made her first appearance in *I Puritani*. In 1863 she withdrew from the stage and married Capt. Carvell, a retired officer of the East India service, who died in 1865. Having lost all her property by an unfortunate investment, she returned to the profession, and joined a concert company which Mr. H. L. Bateman was organizing for the United States. Her first appearance in this country at Irving hall, New York, in September, 1865, was exceedingly successful. She returned with the same manager in 1866-7, and in the course of the season married the violinist Carl Rosa. In New York, Boston, and other American cities she sang frequently in oratorio, winning probably in this class of music her most enduring fame. She appeared also from time to time in Italian opera. In 1869 she and her husband organized an English opera company, with which during three winters they made tours of the principal American cities, producing for the first time in America Weber's "Oberon," and reviving Mozart's "Marriage of Figaro." During the winter of 1872-3 she was a member of the Italian opera company at the khedive's

theatre in Cairo. The next season M. and Mme. Rosa formed an English opera company, with which after a tour in England they proposed returning to America. Mme. Rosa was large in person, with a handsome countenance, and a physique of remarkable endurance.

ROSA, Francisco Martinez de la. See MARTINEZ DE LA ROSA.

ROSA, Monte, a mountain group at the eastern extremity of the Pennine Alps, on the frontier line between the Swiss canton of Valais and the kingdom of Italy, in lat. 45° 55' N., lon. 7° 52' E. It is, after Mont Blanc, the loftiest mountain of the Alps, the highest peak being 15,150 ft. above the sea. The main ridge stretches S. from the peak known as Nordende to the Parrot-Spitze, where it connects with the Lyskamm range. Between these points two principal branches radiate, one westward, with the highest summit or Höchste Spitze at its junction with the main ridge, and the other eastward from the Signal-Kuppe, somewhat to the south of the middlemost point. Four angles are thus formed; those on the west contain the Monte Rosa and Lys glaciers, and give rise to the great Gorner ice stream, and those on the east enclose the Macugnaga and Sesia glaciers. Monte Rosa thus forms a part of the watershed between the basins of the Rhône and the Po. The mountain walls are most precipitous in the N. E. angle above the Macugnaga glacier. Along the crest, especially in the neighborhood of the Höchste Spitze, the edge is sometimes so sharp as to allow the climber to bestride it. All the summits of Monte Rosa are composed of gneiss and white mica slate, and all have of late years been ascended.

ROSA, Saint, commonly called St. Rose of Lima, the only canonized saint of American birth, born in Lima in 1586, died there, Aug. 24, 1617. Her parents were wealthy Spaniards, and gave her in baptism the name of Isabel; but, it is said, her extreme beauty in childhood made them call her Rosa. Their fortune having been swept away, Rosa was taken into the household of the treasurer Goncalvo, where she supported her parents by her labor, while following her bent for asceticism. She refused every matrimonial offer, assumed the habit of the third order of St. Dominic, and lived a recluse in the garden of her protectors. She was canonized by Pope Clement X. in 1671, and her feast was fixed on Aug. 30.

ROSA, Salvator, an Italian painter, born at Aranella, near Naples, June 20, 1615, died in Rome, March 15, 1673. In early life he explored the wildest regions of Calabria, associating with banditti, in the interest of his art. After his father's death he supported the family by making drawings on primed paper, which brought his talent into notice; and he afterward studied under Spagnoletto and Aniello Falcone. He then visited Rome, where he became celebrated not only as a painter, but also as a poet, musician, and actor. In 1647 he took part in the insurrection at Naples un-

der Masaniello, after whose overthrow he fled to Rome. Incurring there the displeasure of the authorities by satirical pictures, he escaped to Florence, where he was employed in the Pitti palace; but after some time he returned to Rome. Among his most celebrated works are the "Catiline Conspiracy," "Saul and the Witch of Endor," "Attilus Regulus," and altarpieces. He is best known as a landscape painter, having been one of the first in Italy to practise that branch with success. He delighted in gloomy effects, powerful contrasts of light and shade, and romantic forms. He also excelled in portraits and as an engraver. See "The Life and Times of Salvator Rosa," by Lady Morgan (2 vols., London, 1824), and *Salvatore Rosa*, by Cantù (Milan, 1844).

ROSAMOND, a Lombard queen. See ALBOIN.

ROSAMOND, commonly called "Fair Rosamond," a favorite of King Henry II. of England, the daughter of Walter, Lord Clifford, died in 1177. She was first brought to the king's notice through the collusion of her brothers, who desired to advance their own fortunes by means of their sister's beauty. She lived at Woodstock, where Henry frequently visited her, and bore to him William Longsword, earl of Salisbury, and Geoffrey, who was nominated bishop of Lincoln. She was buried in the church of Goodstone, opposite the high altar, but in 1191 Hugh, bishop of Lincoln, caused her bones to be removed with disgrace. The story of her concealment in a labyrinth and being poisoned by Queen Eleanor lacks historic basis.

ROSARIO, a city of the Argentine Republic, in the province of Santa Fé, on the right bank of the Paraná, 170 m. N. W. of Buenos Ayres; pop. about 40,000, including many foreigners. In 1854, when it contained only 4,000 inhabitants dwelling in wooden sheds and mud huts, it was created a port of entry, and it is now the second commercial city of the republic. The climate is temperate and healthful, the thermometer averaging 78° F., and rarely rising to 100°. The city is well laid out; the streets are paved, lighted with gas, and traversed by cars. There are several handsome churches, theatres, banks, hotels, a custom house, exchange, &c., and docks and wharves are in course of construction. The river here is a mile wide, and vessels of any size may lie alongside of the steep bluff, 50 to 60 ft. high, on which the city stands. Rosario is the natural receiving and distributing centre of a vast region. It is the starting point of the railway system of the interior, designed to consist of two main stems extending to the Pacific coast, with branches to every part of the republic; one line is completed (1875) for nearly 400 m., and another to the Rio Cuarto. In 1874 the official value of merchandise imported direct was \$7,046,400; of the exports, \$2,101,100, of which \$1,073,540 consisted of wool, hides, hair, goat skins, &c., sent to the United States. The movement of shipping to

and from foreign ports was 230,209 tons, 69 per cent. of which was steam.

ROSARY (Lat. *rosarium*), the name given by Roman Catholics to a certain form of prayers recited on a string of beads, and to the beads themselves. This form of prayer was instituted in the 13th century by St. Dominic, as a popular way of meditating on the chief mysteries of Christ's life. It consists of 15 times 10 small beads, every 10 small ones being preceded by one larger one. At each large bead the Lord's prayer is recited, and at each of the smaller ones the "Hail Mary," the 10th "Hail Mary" being followed by the doxology: "Glory be to the Father, and to the Son, and to the Holy Ghost," &c. In each "Hail Mary," after the word "Jesus," which concludes the first half of it, a few words commemorative of a mystery in the life of Christ are inserted. The rosary was intended to be for the laity what the breviary is for the priests; and as the number of "Hail Marys" in the rosary is equal to the number of psalms in the breviary, it is often called *psalterium Marianum*. The name *rosarium* (in mediæval Latin) is probably derived from the appellation *rosa mystica*, by which the Virgin Mary is frequently designated in the prayers of the church. On account of the length of the original rosary, it soon became and still is customary to take for common use only one third of it, which is also called "the small rosary," and popularly the crown (*corona*) or chaplet of the Blessed Virgin.—The Buddhists and Mohammedans likewise use beads for counting their prayers, those of the latter being commonly formed of sacred clay of Mecca or Medina. (See **BEAD**.)

ROSAS, Juan Manuel de. See **ARGENTINE REPUBLIC**, vol. i., p. 693.

ROSCHER, Wilhelm, a German economist, born in Hanover, Oct. 21, 1817. He graduated at Berlin in 1840, and was professor there from 1843 to 1846, and afterward at Leipsic. His principal works are: *System der Volkswirtschaft* (vol. i., *Die Grundlagen der Nationalökonomie*, Stuttgart, 1854; 9th ed., 1871; vol. ii., *Nationalökonomie des Ackerbaues*, 1859; 6th ed., 1870); and *Geschichte der Nationalökonomie in Deutschland* (Munich, 1874).

ROSCIUS, Quintus, a Roman comic actor, born at Solonium, near Lanuvium, died in 62 B. C. Sulla gave him a gold ring, the symbol of equestrian rank. He is frequently spoken of in terms of the highest praise and affection by Cicero, who in his youth received instruction from him, and afterward defended him in a lawsuit. Roscius wrote a treatise in which he compared eloquence and acting. According to Macrobius he received 1,000 denarii (about \$150) every day, and Pliny says that he yearly gained 50,000,000 sesterces.

ROSCOE. I. William, an English historian, born near Liverpool, March 8, 1753, died in Liverpool, June 27, 1831. In 1774 he was admitted an attorney of the court of king's

bench, and commenced practice in Liverpool. He took an active part in the agitation for the abolition of the slave trade, and published "A General View of the African Slave Trade" (1787); "A Scriptural Refutation of a Pamphlet lately published by the Rev. Raymond Harris, entitled 'Scriptural Researches on the Licitness of the Slave Trade,' in four Letters from the Author to a Clergyman" (1788); and "An Inquiry into the Causes of the Insurrection of the Negroes in the Island of St. Domingo" (1792). In 1796 he published "The Life of Lorenzo de' Medici, called the Magnificent" (2 vols. 4to), which was translated into French, German, and Italian; and in 1805 "The History of the Life and Pontificate of Leo X." In a supplementary volume, "Illustrations, Historical and Critical, of the Life of Lorenzo de' Medici" (1822), he replied to various criticisms. In 1806 he was elected a member of parliament from Liverpool in the whig interest, and after the dissolution of that parliament in 1807 he published "Occasional Tracts relative to the War." He was also the author of other works of minor importance, and edited Pope's works (10 vols. 8vo, 1824).—Three of his sons became well known in literature. **ROBERT** (1790–1850) wrote poems, and completed in return for a legacy his friend Mr. Fitchett's posthumous epic "Alfred" (6 vols., London, 1844). **THOMAS** (1791–1871) was distinguished especially as a translator and editor of Italian works. His more important publications are: a translation of the "Memoirs of Benvenuto Cellini" (2 vols., 1822); a translation of Sismondi's "History of the Literature of the South of Europe" (4 vols. 8vo, London, 1823); specimens from Italian novelists (4 vols., 1825), from German novelists (4 vols., 1826), and from Spanish novelists (3 vols., 1832); a translation of the "Memoirs of Scipio de Ricci" (2 vols., 1828); a translation of Lanzi's "History of Painting in Italy" (6 vols., 1828); and a "Life of William the Conqueror" (1846). **HENRY** (1799–1836), barrister at law, published a life of his father (2 vols. 8vo, 1833), and wrote also "Lives of Eminent Lawyers" for "Lardner's Cyclopædia," besides various legal works. **II. Henry Enfield**, an English chemist, son of Henry, born in London, Jan. 7, 1833. He was educated at the Liverpool high school, University college, London, and Heidelberg university. While at Heidelberg (1853–'7) he published in conjunction with Bunsen a series of memoirs on the measurement of the chemical action of light, and other original investigations. In 1857 he was appointed professor of chemistry in Owens college, Manchester, in 1863 became a fellow of the royal society, and in 1873 received the royal medal of that society. He has published "Elementary Lessons in Chemistry" (1866), translated into several languages, and "Lectures on Spectrum Analysis" (1869), giving the first connected account of the discoveries in that branch of science.

ROSCOMMON, an unorganized county of N. Michigan, drained by the south branch of the Au Sable and some of the head waters of the Muskegon and Titibawasee rivers; area, 625 sq. m.; returned as having no population in 1870. It contains several lakes, the largest of which are Higgins's and Houghton's. The surface is rolling, and the soil poor.

ROSCOMMON, a central county of Ireland, in Connaught, bordering on Sligo, Leitrim, Longford, Westmeath, King's, Galway, and Mayo; area, 915 sq. m.; pop. in 1871, 141,246. The Curlew and Brailieve mountains, which attain a height of from 1,000 to 1,200 ft., lie in the north of the county. The Shannon and its tributary the Suck flow on about two thirds of the whole boundary line, the former expanding in several lakes, of which the largest is Lough Ree. The Shannon has been made navigable by means of short canals, and the Suck can be ascended by flat-bottomed boats about 10 m. above its junction with the former. Grazing and agriculture are the chief occupations. Coarse woollen goods are made, and there are manufactories of tobacco pipes and earthenware. The principal towns are Roscommon, the capital, Boyle, and Elphin.

ROSCOMMON, *Wentworth Dillon*, earl of, an English poet, born in Ireland about 1634, died Jan. 17, 1684. He was the nephew of the earl of Strafford, after whose impeachment he went to the continent. After the restoration he held various offices about the court. An edition of his poems was published in 1717, and in the same year his "Essay on Translated Verse." He is reputed to be the only popular poet of the reign of Charles II. whose writings are not immoral.

ROSE, the common name for plants of the genus *rosa*, the ancient Latin name, which has been adopted into most European languages. The genus gives its name to the family *rosaceæ*, which includes most of the cultivated fruits and many of the ornamental plants of northern climates, among which are herbs, shrubs, and trees, with simple or compound, usually alternate and stipulate leaves; flowers usually regular; the sepals mostly united, and often adherent to the ovary; petals four or five, inserted on the calyx, as are the usually numerous, distinct stamens; one to many pistils, distinct or (in the pear tribe) united with the calyx tube; seeds without albumen. About 70 genera are included in this family, which are grouped in several tribes; the characters of the important tribes are given in describing the plants belonging to them; the peach, cherry, and plum represent the tribe *prunææ*; the almond represents the *amygdalææ*; *spirææ* stands for another subtribe; the *rubeææ* are described under RASPBERRY; the strawberry represents another tribe; while the apple, pear, quince, and thorn are familiar representatives of the most important tribe, *pomeææ*. In the tribe *rosææ* the only genus is *rosa*, which, while widely differing in appearance from the genera

just referred to, has all the essential characters of the family in common with them. The species of rose are all shrubs, sometimes climbing, and generally prickly; they have alternate, odd-pinnate, and generally serrate leaves, with stipules united with the base of the petiole; flowers solitary, or in clusters at the ends of the branches; calyx with an urn-shaped tube, contracted at the mouth, and five spreading, often leafy lobes; petals five, spreading, and with the numerous stamens inserted on the edge of the hollow, thin disk that lines the calyx tube; pistils numerous, concealed in and attached to the lower part of the disk, their hairy ovaries becoming bony akenes in fruit; in ripening, the enlarged calyx becomes fleshy, often colored, and forms a fruit popularly known as hip or hep. The foliage, stems, and calyx in some species bear aromatic glands. There are few genera in which so much confusion exists in regard to species as in the rose, the plants being very variable even in the wild state; about 180 species have been described, and many more enumerated, but the best authorities admit only about 30; in the limited area of Great Britain some botanists find 20 species, while others reduce these all to five. Probably the next revision of the genus will reduce the North American species to six or eight, though several more have been described; of these, three are frequent in the northern states. Our most common wild rose on dry soils is the dwarf rose (*rosa lucida*); it is from 1 to 3 ft. high, the stems with bristly prickles, the depressed-globular hip smooth when ripe; this varies greatly in wet soil, and forms of it have been described as distinct species; it blooms from May to July, while the swamp rose (*R. carolina*) blooms from June to September; this has stems 4 to 7 ft. high, armed with stout hooked prickles, and the fruit is somewhat bristly; it is found in low moist grounds as well as in swamps. These two are the common wild roses in the eastern states, and extend as far south as Florida. The early wild rose (*R. blanda*), 1 to 3 ft. high, is nearly unarmed, or has a few straight deciduous prickles; the flower stalks and calyx, which are glandular bristly in both the preceding, are in this smooth and glaucous; this is a northern species found as far as Hudson bay; it extends from Vermont along the northern border to California, and has been described under several names. The prairie, Michigan, or climbing rose (*R. setigera*), our only scandent species, makes shoots 15 to 20 ft. long in a season; it has stout, nearly straight prickles; leaves with only three to five leaflets; the abundant flowers, produced in July, are deep rose-colored, changing to white; unlike any other native species, this has its styles united in a column and projecting beyond the calyx tube; common in rich soil from western New York, westward and southward, and sometimes cultivated, though not so often as the double varieties derived from it.—A few ex-

otic species are more or less naturalized; the best known is the sweetbrier (*R. rubiginosa*), which is here used to illustrate the structure of the genus. It is about 6 ft. high, but may be trained much higher; its stems have strong, hooked prickles, with some smaller awl-shaped



Sweetbrier Rose (Section of Flower and the Fruit).

ones; the doubly serrate leaflets have the under surface downy and clothed with russet glands, which, especially when bruised, give off a characteristic and pleasant fragrance; the small pink flowers are mostly solitary, with a pear-shaped hip. This is sometimes called eglantine, a name which was formerly applied to roses in general. The dog rose (*R. canina*) of Europe, which occurs in some parts of Pennsylvania, is the common briar of England, and is found throughout Europe and Russian Asia; it is close to the sweetbrier, but has no aromatic glands; in England this is largely used as a stock upon which to bud the finer kinds of roses. The most important introduced species is the Cherokee rose, which Michaux, regarding it as indigenous, described as *R. lavigata*, but it is now certain that it is a Chinese species (*R. Sinica*), introduced into Georgia and South Carolina before the revolution; it has every appearance of a foreign species, and is found in China, where it is the common wild rose; it is a vigorous climber, reaching the tops of tall trees, and hanging in shoots and festoons 20 to 40 ft. long; the otherwise smooth stems have strong, sharp, curved prickles, and its leaves, usually of only three leaflets, glossy and evergreen; the flowers, which appear in the greatest profusion in early spring, are large, single, and of a peculiarly clear and pure white. This has proved to be one of the most valuable of all hedge plants for the southern states; hedges made over 50 years ago are still in full vigor. Cuttings are set in the hedge row, 3 ft. apart; the growth of the first year is the next winter cut back to within a foot of the ground; after this the long and vigorous shoots are allowed to grow and are directed on the line of the

hedge, where they pile up and interlace to form an impenetrable barrier. Cultivators near Boston have found the Cherokee rose admirable for the greenhouse, the great abundance of the flowers and their purity compensating for their singleness. Another Chinese rose used in the southern states for hedges, and somewhat naturalized, is the Macartney rose (*R. bracteata*), introduced into England by Lord Macartney in 1795; it is barely hardy in England, but in the southernmost states is evergreen, and differs from the foregoing in having the stems downy as well as prickly, and its calyx covered by leafy bracts; in low rich soils it is preferred as a hedge plant to the Cherokee.—The foregoing wild or naturalized roses are botanical species in their normal form, with single flowers; the roses of our gardens and greenhouses are for the most part varieties obtained by selection and by hybridizing and crossing, and this has been continued so long that often all traces of their original parentage are concealed. Bud variation is remarkably frequent in the rose; a bud will often produce a shoot upon which the flowers, and even the leaves, are in form and color unlike those upon the rest of the plant; these bud variations may be propagated by cuttings or by budding, and several of our well known kinds were thus obtained. The most prized garden roses are double; *i. e.*, instead of the five petals of the wild flower, these are multiplied indefinitely; some roses are so double that no stamens can be seen, while others are only partly double; the doubling is due (in good part, at least) to the conversion of stamens into petals (see PLANT); any partly double rose will show the gradual metamorphosis from the proper stamen through intermediate states to the fully developed petal, as indicated



Transformation of Stamens into Petals.

in the accompanying diagram.—In the enumeration of cultivated roses, a garden rather than a strictly botanical classification is most convenient. 1. *Climbing Roses*. The prairie rose (*R. setigera*) has been mentioned as a native species; from this Samuel Feast of Baltimore and others have obtained our most valuable climbers, hardy from Canada to the gulf, and producing a great profusion of showy though scentless flowers; they are evidently crossed with foreign kinds; the Queen of the Prairies is the best known of these, and will grow in any soil; another is the Baltimore Belle; and there are several others of the prairie group with flowers from white to deep rose. The evergreen rose (*R. sempervirens*) has given

rise to another race of climbers; it is the wild rose of Italy, where, as in other warm climates, it is evergreen, but not so in the north, where some of its varieties are hardy and others tender; it has very bright green leaves, and in its wild state produces an abundance of single white flowers; its best double variety is *félicité perpétuelle*. The Ayrshire roses, of which there are pink sorts, are varieties of this; they grow with great vigor, producing shoots 20 to 30 ft. long, and are useful for covering walls, banks, and other objects. The musk rose (*R. moschata*) is a native of Asia, where it grows to a great size; its cultivated varieties are treated as climbers by training up their shoots; the flowers, later than those of any other, are in large clusters, white or yellowish white, and very fragrant, especially in the evening; the "white musk cluster" is the best known variety. The many-flowered rose (*R. multiflora*), from Japan and China, has furnished a race of climbers, most of which are not hardy north of the middle states; it has large clusters of small, scentless, white and pale purple flowers; the Seven Sisters, or *Grevillei*, is one of the best varieties. The Boursalt roses are supposed to be from this, crossed with some hardier species; they are hardy, rampant growers, with long red stems, and produce a profusion of blush or crimson-purplish flowers, which are odorless. The Banksia or Lady Banks's rose (*R. Banksiae*), from China, is (at the north, at least), only a greenhouse climber; it has very glossy foliage, and umbels of double small roses, not larger than the flower of a double cherry, white or buff, and with a violet fragrance. 2. *Garden Roses*. Under this not very definite title are included those non-climbing kinds which, without regard to their origin, bloom but once in the season; some of these are but little removed from their normal form, such as the Scotch roses, which originated from the Burnet rose (*R. pimpinellifolia*) of temperate Europe and Asia; they grow from 1 to 2 ft. high, and are exceedingly prickly; their leaflets are small, roundish, and smooth, and their small flowers, abundantly produced all along the stem, are about two weeks earlier than other garden roses. The first double variety was found near Perth, Scotland, and has been reproduced abundantly by seed, giving white, pink, and yellow sorts; there are between 200 and 300 named varieties; among the most distinct are Countess of Glasgow, pink, William IV., pure white, and Yellow Scotch. The yellow brier (*R. eglanteria*), closely related to the sweetbrier, produces double yellow, buff, and orange varieties, among which are Harrison's yellow, the best known yellow rose, but inferior to the Persian yellow. The yellow rose (*R. sulphurea*) of Persia and the far East, also known as the yellow Provence, produces large full double flowers, of a fine transparent yellow; it is rarely seen in our gardens, it being of doubtful hardiness, and very difficult to cultivate, the buds spoiling be-

fore opening. The cinnamon rose (*R. cinnamomea*), from Europe, is rarely met with except in old country gardens, from which it has in some places escaped and become partially naturalized; it has brownish red bark, a few prickles, and small double but badly shaped flowers with a cinnamon-like fragrance; it is closely related to the wild *R. blanda*. The white rose (*R. alba*), from central Europe, is very near the dog rose, and has given several white and blush varieties. The common summer or June roses are from the French or Provence (*R. Gallica*), the hundred-leaved or cabbage (*R. centifolia*), and the damask rose (*R. Damascena*); while these are distinct in their typical forms, they are much confused in the garden varieties, and the most skilled rosarians are unable to trace them to their original species. While these old-fashioned roses have been largely displaced by more recent kinds, none exceed them in beauty and fragrance, or in the abundance of flowers during their short season.—The pomponé or button roses are dwarf, small-flowered forms of the hundred-leaved. The most striking varieties are those known as moss roses, in which the glands and bristles upon the flower stalk, and especially upon the calyx, are developed as a substance resembling moss; this was supposed to be due to injury by insects, until it was found that the peculiarity was reproduced by seeds. The first moss rose was introduced into England from Holland in 1596, and until early in the present century it was the only variety known; and although more than 100 others have since been introduced, the old or common moss is not exceeded by any in the abundance and beauty of its mossiness. Celina and Lane's are good varieties, and some of the newer kinds have good flowers when full-blown. A favorite sort, the crested moss (*eristata* of the catalogues), unlike the others, is said to be a variety of the Provence; its calyx lobes are fringed by a broad and much cut crest, rather than the fine mossiness of the other kinds. 3. *Roses blooming more than once in the season*. The most popular garden roses are the remontants, more generally known as hybrid perpetuals, an incorrect name, as they are not perpetual bloomers, but produce abundantly in June, and after a season of rest bloom again in autumn; they have also been called autumnal roses, but the varieties differ greatly in their ability to flower a second time, and the French term *remontant* (growing again) is adopted by the best rosarians. This class of roses is the result of various crossings of other classes derived from the China or India rose (*R. Indica*), and includes also a strain of the damask rose; they have great size, the most brilliant colors, and exquisite fragrance, with perfect hardiness; the great show roses and those of the rose fanciers are found here, and are the kinds referred to as having so generally superseded the old June roses; it being a mixed race, varieties quite unlike in appearance are com-

prised in it, and they differ according to the preponderance of one or another parent. They are numbered by hundreds, and the list receives annual additions through the labors especially of the French, and to some extent of the English growers; Baron Provost, General Jacqueminot, Giant of Battles, Jules Margottin, and La Reine are well known and fine examples of this class. There are a few moss roses which, having a tendency to bloom a second time, are classed as remontant moss.—The Bourbon rose, first obtained on the isle of Bourbon by a cross between the China and a damask variety, is a race including some magnificent kinds, but they are not so generally hardy as the preceding; they are abundant bloomers, and are useful for forcing; the Souvenir de Malmaison, everywhere a standard of perfection, belongs here, as does Hermosa, so much valued for forcing. 4. *Roses which bloom continuously all the year.* The Bourbons are classed among the ever-blooming roses, but they are less constant than the China roses, which are varieties of *R. Indica* and prized for the abundance and brilliancy of their flowers; they are too tender for northern winters, but are easily protected by bending down the stems and covering them with sods, or by placing them in a frame and covering with leaves; the readiness with which they may be multiplied makes them the cheapest of all roses, and they are much used for bedding out in summer, where they flower in the hot months; they are well adapted to greenhouse culture, and are the easiest of all to grow in the window garden; they are popularly known as monthly roses, and are given in some catalogues as Bengal roses. Agrippina, Daily Blush, Daily White, and Mrs. Bosanquet are among the best of this class.—The Noisette roses originated with M. Noisette, a florist at Charleston, S. C., who in 1817 crossed a musk rose (*R. moschata*) with the pollen of a tea rose; they are for the most part climbers, and have the habit of blooming in clusters of the musk; these have been again crossed with the tea, and varieties produced which are exceedingly difficult to classify. Some of the Noisettes are nearly hardy at the north, while others are very tender; Lamarque is the best known, being everywhere popular as a greenhouse climber; its sulphur-yellow flowers are produced in great abundance; Chromatella and Solfaterra are choice varieties, both darker yellow than Lamarque, which is their parent.—The tea or tea-scented roses are from a variety of the China rose (*R. Indica*, var. *odorata*); they have long buds, semi-double flowers, and a fragrance resembling that of green tea. A blush and a yellow tea rose were brought from China early in the present century, and from these have proceeded a large and increasing class, all of great delicacy of color; some make long branches and are adapted for pillars or rafters; they are more tender than any others, and require the same pro-

tection as the China roses. Buds of tea roses are in great request for winter decorations, and near the principal cities large houses are devoted to rose forcing; the colors are white, buff, salmon, and various shades of yellow and rose, with combinations of these in the same



Double Rose (Noisette).

flower. Among the most popular of the tea roses are Bon Silene, Gloire de Dijon, Isabella Sprunt, Pactole, Safrano, and White Tea; the grand yellow rose, Maréchal Niel, is by some classed as a tea, and by others as a Noisette; it is a rampant grower, and produces freely enormous flowers of a fine golden color, which deepens to the centre.—*Propagation and Cultivation.* New varieties of roses are sometimes obtained from the seed of flowers which have been cross-fertilized, but cultivators, knowing the tendency of flowers so far removed from their normal state to vary, sow seeds from any good variety. Though in very double flowers the stamens may be quite obliterated, the pistils usually remain serviceable, and such may be fertilized with other pollen. The seed should be sown as soon as ripe and exposed to changes of weather, and the plants which appear will in some cases flower the same year, in others not until the next. Established varieties are multiplied by cuttings, by layering, by suckers, and by budding or grafting. Plants which have been potted for the purpose are forced into growth by the florists in early spring, and cuttings are taken of the young and slightly hardened wood; another set of cuttings may be made from the tender shoots formed by roses in the open ground in August, and still another from the ripened wood in October, setting them in a cold frame, and when freezing weather comes on covering them with leaves; the majority of such cuttings will be well rooted in early spring. Layering is a ready method of multiplying hardy roses. (See LAYERING.) In

Europe, where the climate allows rose culture to reach a greater perfection than with us, it has been found that the finest flowers are obtained when the rose is budded on some stock with vigorous roots; the common brier or dog rose, and the Manetti rose, so called from the Italian who raised it from seed, are the usual stocks; the bud is inserted in the ordinary manner (see **BUDDING**), near the ground, unless standard or tree roses are wanted, when the stocks are budded at 4 or 5 ft. high. Budded roses are in little favor in this country, as in our severe winters the plant may be killed quite to its insertion in the stock, and our hot summers induce the stocks to throw up abundant suckers, which weaken the growth of the budded rose and are a constant source of annoyance. Our rose growers prefer roses on their own roots, except for the few varieties which will only bloom freely on other stocks. The tree or standard roses are imported in large numbers every year, but seldom survive the first winter. Roses may be grafted, but this is rarely done.—The soil for roses can hardly be too rich; the hardy kinds may be planted in autumn or in spring; the tender kinds may be set out as soon as frosts are over; in planting, all weak growth should be cut out, and the strong stems shortened to a few buds. Each spring the hardy sorts should have their stems pruned according to their vigor, the weakest being cut out altogether, and the others shortened from one third to one half. Climbing roses need only to have the old wood thinned out.—Few flowering plants have so many enemies as the rose. Aphides or plant lice may be killed by tobacco water; the rose slug, the larva of *selandria rosea*, must be treated to frequent syringing of whale-oil soapsuds, or infusion of white hellebore; the rose bug (*macrodactylus subspinosus*), which eats the buds, can only be conquered by hand picking.—The China, Noisette, tea, and other tender roses are grown in greenhouses and window gardens; for greenhouse management reference must be made to works on floriculture. Roses for house blooming should be potted by September, all the flower buds being removed and the pots kept in a cool place until well established; only the China and tea varieties are likely to give good results, and these will need constant care, as they are very apt to be infested by plant lice and the red spider; tobacco smoke or tobacco water is the remedy for the one, and frequent showering of the leaves with water on both sides for the other.—**Uses.** Roses have long been used in medicine, and two kinds of rose leaves or petals are official in the pharmacopœias of the present day. Red rose leaves are the unexpanded flowers of the Provence rose (*R. Gallica*) collected and dried; they are mildly astringent; their infusion by the addition of a small portion of sulphuric acid turns a brilliant crimson, and is used as a medium for soluble medi-

cines. The confection or conserve of roses, formerly prepared by beating one part of the fresh petals with three parts of sugar, is now made from the powdered dried petals, with honey and rose water; it is used as the base of blue pill, and as a vehicle for other medicines. The hundred-leaved rose (*R. centifolia*) is sometimes used for the preparation of rose water, 8 lbs. of the petals and two gallons of water being placed in a still, and one gallon of rose water distilled off. The petals are sometimes preserved by heating them with twice their weight of salt, to be distilled when required. Most of the rose water now in use is prepared from the oil of roses. In Europe the ripe hips of the dog rose (*R. canina*) are used to prepare a confection; the hairy akenes being separated, the pulpy portion, beaten up with about twice its weight of sugar, forms the confection of dog rose, used for the same purposes as the conserve of roses. Oil, attar, or otto of roses is by far the most important commercial product of the rose. (See **ATTAR OF ROSES**).—The works on general floriculture treat of the rose; the leading special works are: "The Book of Roses," by Francis Parkman (Boston, 1866); "Propagation, Cultivation, and History of the Rose," by Samuel B. Parsons (New York, 1869); "A Book about Roses," by S. Reynolds Hole (London, 1870); and "The Amateur's Rose Book," by Shirley Hibberd (London, 1874).

ROSE. I. Heinrich, a German chemist, born in Berlin in 1795, died there, Jan. 29, 1864. His grandfather, Valentin Rose the elder, and his father, Valentin Rose the younger, were distinguished chemists. He first devoted himself to pharmacy, studied in Berlin, in Stockholm in 1819 under Berzelius, and at Kiel, where he took his degree. In 1823 he became extraordinary and in 1835 ordinary professor of chemistry at Berlin. His *Handbuch der analytischen Chemie* (Berlin, 1829) has obtained wide celebrity. In 1845 he discovered a new metal in the tantalites of Bavaria, which he called niobium. (See **COLUMBIUM**.) **II. Gustav**, a German mineralogist, brother of the preceding, born in Berlin, March 28, 1798, died there, July 15, 1873. In 1820 he took his degree in Berlin, in 1821 studied under Berzelius at Stockholm, in 1822 became keeper of the mineralogical collection in the university of Berlin, and in 1826 was made extraordinary and in 1839 ordinary professor of mineralogy there. He wrote *Elemente der Krystallographie* (2d ed., Berlin, 1838); *Ueber das Krystallisationssystem des Quarzes* (1846); *Ueber die Krystallform der rhomboëdrischen Metalle* (1850); and *Das krystallochemische Mineralsystem* (Leipsic, 1852). With Humboldt and Ehrenberg he travelled through northern Asia in 1829, and published *Reise nach dem Ural, dem Altai und dem Kaspischen Meer* (2 vols., Berlin, 1837-'42).

ROSE. I. Hugh James, an English author, born at Little Horsted, Surrey, in 1795, died

in Florence, Italy, Dec. 22, 1838. He graduated at Trinity college, Cambridge, in 1817, was ordained there in 1818, and in 1825 was chosen select preacher of the university; and at the time of his death he was rector of St. Thomas's, Southwark. In 1832 he founded and edited the "British Magazine," and in 1836 became principal of King's college, London. Among his works are: *Inscriptiones Græcæ Vetustissimæ* (8vo, 1825); "Christianity always Progressive" (1829); "Farmers and Clergy" (1831); "Answer to the Case of the Dissenters" (1834); and *Concio ad Clerum* (1835). He was editor of the "Encyclopædia Metropolitana," and projected the "New General Biographical Dictionary," published after his death. **II. Henry John**, an English author, brother of the preceding, born in 1801, died in Bedford, Jan. 31, 1873. He graduated at St. John's college, Cambridge, in 1821, became fellow of his college in 1824, Hulsean lecturer in 1833, rector of Houghton Conquest, Bedfordshire, in 1837, and archdeacon of Bedford in 1866. He edited the "Encyclopædia Metropolitana" from 1839, and also the first volume of "Rose's Biographical Dictionary;" translated Neander's "History of the Christian Religion and Church during the first three centuries" (2 vols., 1831; 2d ed., 1842); contributed one of the essays in "Replies to Essays and Reviews" (1861); edited in conjunction with the Rev. J. W. Burgon, Schnorr's "Bible Prints," with accompanying letterpress (1864); and was one of the authors of "The Speaker's Commentary." He also published "The Law of Moses viewed in Connection with the History and Character of the Jews" (Hulsean lectures, 1834), and reprinted from the "Encyclopædia Metropolitana" his "History of the Christian Church from 1700 to 1858" (1858).

ROSE BAY. See RHODODENDRON.

ROSE BUG, a diurnal beetle of the melolonthian group, the *melolontha subspinosus* (Fab.) or *macrodactylus subspinosus* (Lat.). It is about $\frac{3}{5}$ of an inch long, buff yellow above and white below, with a slender body tapering before and behind, entirely covered with very short ashy yellow down; thorax angularly widened in the middle of each side, which suggested the specific name; the legs slender, yellow or pale red, with the joints of the feet very long and tipped with black. This insect, one of the greatest pests in gardens and nurseries, was unknown in northern New England until within 50 years; its annual appearance coincides with the blossoming of the rose, whence the common name; it attacks also grape vines, young apples and other fruits, garden vegetables, corn, forest trees, and even grass, devouring flowers, leaves, and fruit. They arrive in swarms unexpectedly, and disappear as suddenly; they emerge from the ground about the second week in June, and remain 30 or 40 days, when the males die, and



Rose Bug.

the females enter the earth, lay their eggs, and return to the surface to perish; the eggs are about 30, nearly globular, whitish, $\frac{1}{16}$ of an inch in diameter, placed from 1 to 4 in. below the surface, and hatched in 20 days. The larvæ begin at once to feed on tender roots, and by the autumn are nearly three fourths of an inch long and one eighth of an inch in diameter; they are yellowish white, bluish toward the posterior end, with a few short hairs; there are six short legs, a pair to each of the first three rings behind the head, the last part covered with a horny shell of a pale rust color; in October they descend below the reach of frost, and pass the winter in a torpid state; in the spring they come toward the surface and form little shells of earth, within which they are transformed during May into pupæ; these are yellowish white, with stump-like wings, legs, and antennæ folded on the breast, and the whole enclosed in a filmy skin which is rent in June, and the perfect beetle digs its way to the surface. As they are beyond reach during the egg, larva, and pupa states, they can only be exterminated as perfect insects; they are destroyed by crushing, scalding, and burning, after being shaken daily from the infested plants. They are occasionally found in immense numbers on the flowers of the worthless whiteweed (*chrysanthemum leucanthemum*); in this case it is expedient to mow it, and consume it with them on the spot. It is said that they never infest the cinnamon rose. This is one of the most destructive of insects, in some places in the west having consumed year after year the crop of young apples; choice fruits in such cases can only be preserved by covering them with netting. Insectivorous birds devour these beetles; moles and various predaceous animals and insects also eat them; young chickens are said sometimes to be killed by the irritation produced by the prickly feet and sharp claws of these insects which they have swallowed.—The European rose chafer is another allied lamellicorn beetle, the *cetonia aurata* (Fab.).

ROSECRANS, William Starke, an American soldier, born at Kingston, Ohio, Sept. 6, 1819. He graduated at West Point, and served for a year as assistant engineer in the construction of fortifications at Hampton Roads, Va. From 1844 to 1847 he was assistant professor of engineering and natural philosophy at West Point. He resigned his commission in 1854, and became a civil engineer and architect at Cincinnati, was superintendent of a coal company, and also engaged in the manufacture of kerosene oil. At the commencement of the civil war he became voluntary aide-de-camp to Gen. McClellan, who commanded the department of the Ohio, and was soon made brigadier general of the regular army. He took a prominent part in the operations in Western Virginia, and was put in command of that department when McClellan was placed at the head of the army. In March, 1862, he was made

major general of volunteers, and was placed in command of the army of the Mississippi, and fought the battles of Iuka (Sept. 19) and Corinth (Oct. 3, 4), in both of which he was victorious. In October he was made commander of the army of the Cumberland, and fought against Gen. Bragg the battle of Murfreesborough or Stone river, Dec. 26, 1862, to Jan. 2, 1863. Crossing the Cumberland mountains and the Tennessee river, he was defeated by Bragg at the battle of Chickamauga, Sept. 19, 20, and was relieved from the command and succeeded by Gen. Thomas. In January, 1864, he was placed in command of the department of the Missouri. He was mustered out of the volunteer service in 1866, and resigned his commission in the United States army in 1867. In 1868-'9 he was for a few months minister to Mexico.

ROSELLINI, Ippolito, an Italian Egyptologist, born in Pisa, Aug. 13, 1800, died in Florence, June 4, 1843. In 1824 he was appointed professor of oriental languages in the university of Pisa. He became a disciple of Champollion in the study of Egyptian hieroglyphics, and when in 1824-'6 that scholar examined the Egyptian monuments in the capitals of Italy, Rosellini attended him, and returned with him to Paris. In 1827 the grand duke of Tuscany, Leopold II., sent him and six companions to explore the monuments of Egypt; and he joined Champollion's party sent out at the same time by the government of France on a similar expedition. The results of both expeditions were to appear conjointly; but on the death of Champollion in 1832, Rosellini took sole charge of the publication, the last volumes of which were completed after his death by friends. After his return to Pisa he was appointed librarian of the university, and in 1839 he began a series of archæological lectures; but in 1841 he gave up all other labor to devote himself to Egyptology. His great work is entitled *I monumenti dell' Egitto e della Nubia* (9 vols. 8vo with 3 vols. fol. of plates, Pisa, 1832-'43).

ROSEMARY (Lat. *rosmarinus*, dew of the sea, the plant growing wild upon the Mediterranean coast), a genus of the labiate family, consisting of a single species, *rosmarinus officinalis*. Rosemary is a shrub 4 or 5 ft. high, with opposite, sessile, entire, linear leaves, about an inch long, which are rather thick, and revolute on the margins, the upper surface smooth and green, the under side white-hoary, with stellate hairs; the pale blue flowers appear in the axils of the upper leaves, and have the structure common to the *monardia* tribe of labiates to which the genus belongs. All parts of the plant have an aromatic odor and taste due to an essential oil. Its aromatic qualities were known to the ancients, who ascribed numerous virtues to it; in Europe it was formerly used in funeral as well as marriage garlands, it being regarded as the herb of remembrance and fidelity, and there were vari-

ous superstitions connected with it. The Germans appear to value it at present, and the florists near large cities send to market numerous pots of rosemary each spring to supply the demand. It is not hardy north of Virginia. The properties of rosemary are similar to those of other aromatics; it has long had a reputation as a useful stimulant for the hair, and the oil is still employed to perfume hair washes. Dried rosemary tops are sometimes kept in the shops, but it is principally used in the form of oil, which is made in considerable quantities on the southern coast of France and that of Italy, and largely by persons who travel from place to place with a rude still, which they set up in localities where the plant is abundant. The oil of commerce is much adulterated; when pure it has an agreeable odor, and is used in some kinds of perfumery, and as an external stimulant in liniments.—Marsh rosemary is the common name for *statice limonium*, a perennial herb of the *plumbaginaceæ*, the large and intensely astringent root of which is often used in domestic practice.

ROSEN, Friedrich August, a German orientalist, born in Hanover, Sept. 2, 1805, died in London, Sept. 12, 1837. After attending the gymnasium in Göttingen, he studied in Leipsic, and subsequently in Berlin, where he was a pupil of Bopp. In 1826 he published his *Corporis Radicum Sanscritarum Prolusio*, subsequently enlarged under the title of *Radices Sanscritæ* (1827). In 1829 he became professor of oriental languages in the university of London, which post he exchanged for the professorship of Sanskrit. He was also secretary to the oriental translation committee, and honorary foreign secretary to the royal Asiatic society. He published in 1831 an Arabic treatise on mathematics by Mohammed ben Musa, and wrote the oriental articles for the "Penny Cyclopædia." At the time of his death he was at work on an edition of the Rig-Veda, and the Asiatic society published in the following year the portion completed by him. He revised the Bengalee, Sanskrit, and English dictionary of Sir Graves Haughton.

ROSENKRANZ, Johann Karl Friedrich, a German philosopher, born in Magdeburg, April 23, 1805. He graduated at Halle in 1828, and was professor there from 1831 to 1833, and subsequently at Königsberg. He has extended the system of Hegel, applying it to all spheres of thought and life. His best known works are: *Psychologie* (Königsberg, 1837; 3d ed., 1863); *Geschichte der Kant'schen Philosophie*,



Rosemary (*Rosmarinus officinalis*).

forming the 12th and last volume of his and F. W. Schubert's complete edition of Hegel's works (1838-'40); *Studien* (5 vols., 1839-'47); *Die Pädagogik als System* (1848; English translation by Anna C. Brackett, St. Louis, 1873); *Die Wissenschaft der logischen Idee* (2 vols., 1858-'9); *Diderot's Leben und Werke* (2 vols., 1866); *Hegel's Naturphilosophie* (1868); *Hegel als Nationalphilosoph* (1870; English translation by G. S. Hall, London, 1874); *Von Magdeburg und Königsberg* (1873); and *Neue Studien* (1874-'5).

ROSENMÜLLER. I. Johann Georg, a German theologian, born at Ummerstädt, near Hildburghausen, Dec. 18, 1736, died in Leipsic, March 14, 1815. He became professor of theology at Erlangen in 1775, at Giessen in 1783, and at Leipsic in 1785, and also superintendent of the Lutheran church. He wrote *Religionsgeschichte für Kinder* (1771; 10th ed., 1827); *Christlicher Unterricht für die Jugend* (1773; 14th ed., 1822); *Historia Interpretationis Librorum Sanctorum in Ecclesia Christiana, ab Apostolorum Ætate ad Literarum Instauracionem* (5 parts, 8vo, 1795-1814); and *Scholia in Novum Testamentum* (6th ed., 6 vols., 1815-'31).

II. Ernst Friedrich Karl, son of the preceding, born Dec. 10, 1768, died in Leipsic, Sept. 17, 1835. He was professor of oriental languages at Leipsic, and published *Scholia in Vetus Testamentum* (23 vols. 8vo, Leipsic, 1788-1835). A "Compendium of the Scholia," containing the Pentateuch, the Psalms, Job, and the prophets, was executed by Dr. J. C. Lechner, with the cooperation of the author, in 5 vols. (1828-'33). He also wrote a *Handbuch der biblischen Alterthumskunde* (4 vols. 8vo, 1823-'31).

ROSE OF JERICHO, a trivial name for an oriental plant of the *cruciferae* or mustard fam-

which is found in northern Africa, Syria, and Arabia. It is an annual, and grows in sandy wastes; its main stem is very short, and its branches, which are a few inches long, spread in all directions; it has obovate leaves, and small, sessile, white flowers, succeeded by globose pods, each of which has two rounded earlike projections. The plant in flower during the growing season presents no unusual appearance, but as the pods begin to ripen on the approach of dry weather, the branches, which were heretofore succulent and spreading, drop their leaves, and become hard and woody; at the same time each branch curls inward from the tip, and when completely ripe the whole plant appears like a ball of curious wickerwork at the top of a short stem; most of the root dies away, and the fierce autumn wind readily uproots the dead plants, which are rolled along before it to a great distance. Should the plant, as it often does, reach the sea or other body of water, or should it be lodged somewhere on dry land until a rain falls, then the curled and dried branches, under the influence of moisture, unbend and resume their proper position; the pods open and discharge their seeds, it may be at a great distance from the locality where the plant made its growth, illustrating one of the many methods by which the distribution of plants is effected. In its native country the plant is surrounded by various superstitions. Besides rose of Jericho, it was called by the monks *rosa Mariae*, and in Palestine it is known as *raf Maryam*, Mary's flower, it being asserted that the flower, as it is called, expands each year on the day and hour of Christ's birth. The phenomenon of the so-called blooming, which is simply a hygrometric change of form, may be repeated as often as the plant becomes dry and curls into a ball. It is said that women in the countries where it is found place the plant in water at the commencement of labor, hoping that the expansion may be the signal of their deliverance. Other plants have similar hygrometric properties; this is sometimes called "resurrection plant," a name also given to a still more striking club moss of the Pacific coast. (See LYCOPIDIUM.)

ROSE OF SHARON. See HIBISCUS.

ROSETTA (Arabic, *Rashid*), a town and seaport of Lower Egypt, on the westerly or Rosetta branch of the Nile, 36 m. E. N. E. of Alexandria, and 6 m. from the Mediterranean by way of the river; pop. in 1872, 15,002. It is about 1½ m. N. of what is supposed to be the site of the ancient Bolbitine. Rosetta is regarded as one of the most attractive towns in Lower Egypt. It contains many beautiful gardens, and the houses are well built, although numbers of them have been allowed to fall into ruin. The port is secure, but is difficult of entrance, owing to a shifting sand bar. The trilingual inscription known as the "Rosetta stone," the key to the discoveries of Young and Champollion, was found here. (See EGYPT, LANGUAGE AND LITERATURE OF.)



Rose of Jericho (*Anastatica hierochuntina*). The Dead Plant and a Leafy Branch.

ily, *anastatica hierochuntina* (Gr. *ἀνάστασις*, resurrection), the only species of the genus,

ROSEWOOD, the name under which several costly kinds of ornamental wood are found in commerce, coming from different countries and afforded by various known and unknown trees of different species and families. Usually they are of a deep rose color, veined and clouded with dark purple, which on exposure becomes nearly black, and have the odor of roses, which is especially manifested when the wood is worked. The best known rosewoods are from Brazil and other parts of South America, and are from different species of *Dalbergia* and *machærium*, of the order *leguminosæ*; they are imported in semi-cylindrical slabs, about 12 ft. long and from 12 to 22 in. in diameter; the bark is removed, and the trunk split through the centre in order that the quality of the wood in the interior may be inspected, as it varies greatly in the fineness of grain; varieties which come in short cylindrical pieces, known as violet wood and king wood, are supposed to be from related trees. African and Burmese rosewoods are from species of *pterocarpus*, of the same family. Other countries have rosewoods produced by trees of other families, among which are those of Jamaica afforded by species of *amyris*, of the *burseraceæ*, and *Linociera*, of the olive family. Rosewood is used for the finer kinds of furniture and cabinet work, but it has less strength than some less expensive woods.—Under the name of oil of rosewood or oil of rhodium there is found in commerce a thick yellowish oil, used in perfumery, especially to adulterate oil of roses, and by fur trappers to scent the bait of their traps; this has been erroneously supposed to be from the ordinary rosewoods, but it is obtained from what is known in French commerce as *bois de Rhodes*, or *lignum rhodium*; it is in sticks of 3 or 4 in. diameter, with a strong odor of rose. It is the stems and roots of two species of *rhodoriza*, of the convolvulus family, a genus confined to the Canary islands.

ROSICRUCIANS, the name of a secret society first known in the 17th century. In *Chymische Hochzeit Christiani Rosenkreuz* (1816), ascribed to J. V. Andrea, there is a story of a certain Christian Rosenkreuz, a German noble of the 14th century, who had spent a large portion of his life in the East in the pursuit of wisdom. After returning to Germany he established a secret society, consisting of but few members, which met in a building erected by himself and called *Domus Sancti Spiritus*, where he died at the age of 106, after ordering the following words to be inscribed upon one of the doors of the edifice: *Post CXX annos patebo*. The spot where he was buried was kept secret, and new members were silently admitted from time to time to keep up the numbers of the society. In the "Revelation of the Fraternity of the Holy Cross to the Learned of Europe," a declaration was made that the order had no intention of interfering with the religious or political action of states,

but only desired the improvement of mankind by the discovery of the true philosophy; and that meetings were held once a year to admit new members, and to deliberate upon secret matters. Whether such a fraternity ever existed, except in the brain of the author of the above mentioned works, is an open question; but the impression that it existed gave rise to fraternities that spread over Europe, and the term Rosicrucian came to be applied to all kinds of occult skill. The fraternity had not been heard of for a long period, when in the latter half of the 18th century interest in them was revived, especially by Cagliostro, who pretended that he was a Rosicrucian.—See J. G. Buhle's *Ueber den Ursprung und die vornehmsten Schicksale der Orden der Rosenkreuzer und Freimaurer* (Göttingen, 1804).

ROSIN, the residue after the distillation of the volatile oil from the turpentine of different species of pines. It is rather an incidental product of the preparation of the oil of turpentine, which, though amounting to only 10 to 25 per cent. of the turpentine (and the rosin constituting the large remainder), is by far the most valuable product. (See **TURPENTINE**.) The rosin while still liquid is drawn off into metallic receivers coated with whiting to prevent adhesion, and from these it is transferred to the casks for shipment. When the distillation is stopped at the proper point, the product is the yellow rosin, which contains a little water; or this may be expelled, and the product is then transparent rosin. By continuing the heat the residue in the stills is made brown or black, a variety which in Europe is sometimes known as colophony. Rosin melts at 276° F., and becomes completely liquid at 306°; at 316° it emits bubbles of gas, and at a red heat it is entirely decomposed. Its specific gravity varies from 1.07 to 1.08. It is insoluble in water, but dissolves easily in alcohol, ether, wood spirit, and both fixed and volatile oils. Strong acids dissolve and decompose it. Chemically it is for the most part a mixture of several resinous acids, viz.: picric, which forms the principal part, sylvic, and colophonic; sometimes also pimaric acid. These acids are isomeric, having a common formula, $C_{20}H_{30}O_2$. They are perhaps formed by oxidation of oil of turpentine. When quickly heated in a retort, it distils partly undecomposed, and partly resolved into gases and volatile oils, leaving a small residue of carbonaceous matter. When the distillation is performed on a larger scale, the gases evolved are air, carbonic acid, carbonic oxide, and carbides of hydrogen; at a higher temperature the oxygen disappears. The first portion of the liquid distillate is yellow and mobile; later a viscid, fluorescent oil passes over, called rosin oil. At a red heat rosin yields a mixture of gases, burning with a very luminous flame, which are largely used in villages and isolated buildings instead of coal gas.—Many attempts have been made to bleach the common sorts of rosin, which would

add materially to their value. By the process of Messrs. Hunt and Pochin, the rosin is distilled at a temperature below that by which it would be decomposed, the process being conducted with steam under a pressure of ten atmospheres. The maximum temperature allowed is about 600°. The rosin and steam are collected and condensed in a suitable receiver kept as cold as possible by the application of water, and free from the moisture of the condensed steam. Instead of steam, carbonic acid, or a mixture of carbonic acid and nitrogen, or hydrogen gas, &c., is introduced to decolor the rosin. The product is white and almost transparent, and is greatly preferred to the crude article by soap and varnish makers.—Rosin is employed for a variety of useful purposes. It is an ingredient in varnishes, and is united with tallow in the preparation of cheap candles. It answers to some extent as a substitute for fixed oil or fat in the manufacture of yellow soap; but, without glycerine in its composition, it possesses no true saponifying properties. (See SOAP.) Rosin is also used in perfumery, and in various pharmaceutical preparations, as plasters and ointments. In caulking the seams of ships it is used in a melted state to fill them, and by oakum makers it is intermixed in a pulverized state with the oakum to increase its weight. It enters into the composition of some fireworks, and is used as a reducing agent in soldering. Another well known use of it is for covering the bows of violins, to prevent them from slipping over the strings without producing vibration. In France rosin oil is largely used as an ingredient in printers' ink, and elsewhere in the composition of coarse lubricating oils. Nearly all the rosin of commerce is furnished by North America.

ROSINI, Giovanni, an Italian author, born at Lucignano, Tuscany, June 24, 1776, died in Pisa, May 16, 1855. He became in 1803 professor of Italian literature at the university of Pisa. He prepared new editions of Guicciardini's *Storia d'Italia* (10 vols., 1819-'20), and of Tasso's works (33 vols., 1821-'32). He wrote the novels *La monaca di Monza* (3 vols., 1829) and *Luisa Strozzi* (4 vols., 1833), *Storia della pittura italiana* (2d ed., 7 vols., 1848-'52), and other works.

ROSIN WEED. See SILPHIUM.

RÖSKILDE, a town of Denmark, in the island of Seeland, on a branch of the Issefiord, 20 m. W. by S. of Copenhagen; pop. about 5,000. It was the ancient capital of the kingdom, but ceased to be a royal residence in 1443. The cathedral, dating from 1084, is the largest and finest in Denmark, and contains more than 70 tombs of Danish kings and members of the royal family. Outside of the town is the large lunatic asylum, called Bidstrup, belonging to the city of Copenhagen. Charles X. (Gustavus) of Sweden, after several victories over Frederick III. of Denmark, concluded a treaty here in March, 1658.

ROSMINI SERBATI, Antonio, an Italian philosopher, born in Roveredo, March 24, 1797, died at Stresa, July 1, 1855. He took priest's orders at the age of 24, and in 1827 published his *Introduzione alla filosofia*, followed in 1829 by *Il nuovo saggio sull' origine delle idee*. In 1828 he founded "the brethren of charity," a religious order, which was confirmed by the pope in 1839. In 1836 he became abbot of San Michele della Chiusa, where he founded "the sisters of Providence." In 1848 Pius IX. nominated him to the cardinalate; but on account of his work on church government and reform, *Cinque piaghe della santa chiesa* ("Five Wounds of the Church"), and one of his political tracts, *La costituzione secondo la giustizia sociale*, he was not confirmed, and the books were put upon the catalogue of the *Index Expurgatorius*. His published works amounted to 35 volumes, 14 being posthumous. Father Lockhart published a memoir of Rosmini in 1856, and Vincenzo Garelli another in 1861. (See PHILOSOPHY, vol. xiii., p. 440.)

ROSSNY, Léon de, a French orientalist, born at Loos, department of Le Nord, Aug. 5, 1837. He studied in Paris, and was appointed in 1863 interpreter of the Japanese ambassadors to the European courts. In 1868 he was appointed to the chair of Japanese at the special school of oriental languages in Paris. He is perpetual secretary of the Asiatic society, and is the founder of the society of American and oriental ethnography. He has published treatises on the Semitic languages and their history, figurative and hieroglyphical writing, the Korean language, text books for learning Japanese, *Dictionnaire des signes idéographiques de la Chine* (5 parts, 1864-'7), *Études asiatiques de géographie et d'histoire* (1864), &c.

ROSS, a S. county of Ohio, intersected by Scioto river and drained by Paint creek; area, about 650 sq. m.; pop. in 1870, 37,097. It has a diversified surface, and the soil, especially in the valley of the Scioto, is very fertile. It is intersected by the Marietta and Cincinnati railroad, and by the Ohio and Erie canal. The chief productions in 1870 were 327,858 bushels of wheat, 2,313,529 of Indian corn, 99,983 of oats, 98,134 of potatoes, 9,368 tons of hay, 4,048 lbs. of tobacco, 85,402 of wool, 334,391 of butter, and 24,191 gallons of sorghum molasses. There were 8,035 horses, 5,532 milch cows, 14,258 other cattle, 24,411 sheep, and 53,926 swine; 23 manufactories of carriages and wagons, 1 of railroad cars, 2 of iron castings, 18 of leather, 3 of liquors, 10 of lumber, 1 of engines and boilers, 2 of paper, 15 of saddlery and harness, 10 flour mills, and 5 woollen mills. Capital, Chillicothe.

ROSS, a county of Scotland. See ROSS AND CROMARTY.

ROSS, Alexander Milton, a Canadian naturalist, born at Belleville, Ontario, Dec. 13, 1832. He was educated as a physician, and has collected a male and a female specimen of every bird, native or migratory, in the Dominion, num-

bering 323 distinct species; his collection in entomology numbers more than 10,000 species; and his botanical collection comprises 620 varieties of flowering plants native to Canada. He has published "Birds of Canada" (1871), and "Butterflies and Moths of Canada" (1872).

ROSS, George, a signer of the Declaration of Independence, born in New Castle, Del., in 1730, died in Lancaster, Pa., in July, 1779. He commenced the practice of law at Lancaster in 1751, and was a member of the colonial assembly of Pennsylvania from 1768 to 1776; and after the substitution for the legislature of the general convention, he was elected to that body also. In 1774 he was one of the committee of seven who represented Pennsylvania in the continental congress, and he remained a member of congress till January, 1777. In April, 1779, he was appointed judge of the court of admiralty.

ROSS. I. Sir John, a British navigator, born at Balarroch, Scotland, June 24, 1777, died in London, Aug. 30, 1856. He served as a volunteer in the British navy from 1786 to 1791, after which for several years he was in the merchant service. In 1799 he became a midshipman, and in 1805 a lieutenant. The next year he received severe wounds in a desperate engagement, for which two years later he was pensioned. He was appointed to the command of the *Briseis* in 1812, and subsequently to that of other vessels. On April 25, 1818, he set sail from the Thames in the *Isabella*, the larger of two vessels sent out to settle the question of a northwest passage, accompanied by Lieut. Parry in the *Alexander*. (See *ARCTIC DISCOVERY*.) He was promoted to the rank of post captain on his return, and published an account of his voyage. In 1829 he made a second voyage to the arctic regions, in a badly constructed steamship called the *Victory*, equipped at the expense of Mr. (afterward Sir Felix) Booth, a distiller of London, and accompanied by a small tender of 16 tons, called the *Krusenstern*. He was frozen up in the ice for four years, and was finally rescued with his crew by the *Isabella*, then on a whaling voyage, in August, 1833, after abandoning his ship in April, 1832. In 1834 he was knighted. From 1839 to 1845 he was consul at Stockholm. In 1850 he went in search of Sir John Franklin in a vessel of 90 tons, and remained one winter in the ice. He attained the rank of rear admiral July 8, 1851. He published "A Voyage of Discovery" (2 vols. 8vo, London, 1819), "A Narrative of a Second Voyage" (2 vols. 4to, 1835-'6), and "A Treatise on Navigation by Steam" (4to, 1828). **II. Sir James Clark**, a British navigator, nephew of the preceding, born in London, April 15, 1800, died at Aylesbury, Buckinghamshire, April 3, 1862. At the age of 12 he entered the navy as a volunteer on board the *Briseis*, then commanded by his uncle. He accompanied Capt. Ross in 1818 as midshipman on his first arctic voyage, was an officer under Parry in his four voyages

between 1819 and 1827, and was promoted while absent on the second voyage to the rank of lieutenant. In 1827, on his return from the fourth voyage, he received a commission as commander. He accompanied his uncle's second expedition, 1829-'33, and in 1834 was made post captain. In 1835 he again visited Baffin bay to search for some missing whale ships, and after his return was employed for several years in a magnetic survey of Great Britain and Ireland. In 1839 he commanded the *Erebus*, to which, with the *Terror*, Commander Crozier, was assigned the duty of exploring the Antarctic ocean. In this voyage, which occupied four years, he made many valuable discoveries. He made an independent discovery of the antarctic continent, which Commander Wilkes, U. S. N., had a few months before discovered and traced at a different point, and gave it the name of Victoria Land; a volcano, 12,000 ft. high, was named Mt. Erebus from his vessel. He returned in 1843, and in 1844 was knighted. In 1848 he was appointed to the *Enterprise*, and made a voyage as far as Barrow strait in search of Sir John Franklin. His only published work is "A Voyage of Discovery and Research in the Southern and Antarctic Regions" (2 vols. 8vo, London, 1847).

ROSS, John, or **Kooweskoowe**, a chief of the Cherokee Indians, born in the Cherokee country, Georgia, about 1790, died in Washington, D. C., Aug. 1, 1866. He was a half-breed, and at an early age had acquired a good English education. He became principal chief of the Cherokees in 1828. In 1835 a treaty was concluded between the United States and Major Ridge, his son John Ridge, Elias Boudinot, and about 600 other Cherokee Indians, by which they agreed to surrender their lands and remove west within two years. Against this treaty Ross and over 15,000 of his tribe protested in an appeal written by Ross and addressed to the president of the United States. But the government sent a force to compel the fulfilment of the treaty, and the Cherokees removed to their new home. Ross continued to be the principal chief, and in 1861 entered into a treaty with the seceding states.

ROSS, Sir William Charles, an English painter, born in London, June 3, 1794, died there, Jan. 20, 1860. In 1837 he was appointed miniature painter to Queen Victoria, and in 1842 he was knighted. He early abandoned historical for miniature painting, but he prepared in 1842 a fine cartoon for the new houses of parliament. Among his original paintings is "The Judgment of Solomon."

ROSS AND CROMARTY, two N. counties of Scotland, which, being politically connected, are generally treated under one head. They border on Sutherland, Inverness, the North sea, and the Atlantic; area, including the N. portion of the island of Lewis, one of the Hebrides, which belongs to Ross, 3,151 sq. m.; pop. in 1871, 80,909. Both coasts are

indented with numerous bays and excellent harbors. There are several lakes, of which the largest is Loch Maree, 12 m. long. The general surface is mountainous, some peaks reaching a height of 3,500 ft. and upward. The scenery is remarkably wild and romantic. The fisheries employ upward of 20,000 hands. Improved breeds of cattle and sheep are extensively reared. Numerous plantations of trees have been formed within the present century, and parts formerly bare are now covered with extensive forests. These counties contain many remains of antiquity. The principal towns are Tain, Dingwall, and Cromarty.

ROSSANO (anc. *Roscianum*), a town of S. Italy, about 3 m. from the gulf of Taranto, in the province and 28 m. N. E. of the city of Cosenza; pop. about 12,000. It is built upon a rocky hill at the foot of the Apennines, and surrounded by deep precipices. It is the seat of an archbishop, and has a fine cathedral, a castle, and a trade in oil, capers, and saffron. During the Gothic wars the ancient Roscianum was one of the strongest places in Bruttium.

ROSSEBACH, a village of Prussian Saxony, 17 m. S. by W. of Halle, celebrated as the scene of the victory of Frederick the Great over the combined French and imperial army, commanded by the prince de Soubise, Nov. 5, 1757. The army of Frederick numbered only half of that of his opponents, the French being officered by noblemen who regarded the expedition as a pleasure excursion. Emboldened by his having retired from before the duke de Broglie's camp at Mülhausen, the French and imperial army left a strong position to attack Frederick without having made a reconnaissance; but they were themselves attacked by surprise, and, though but one wing of the Prussians was engaged, soon broke and fled, leaving their whole artillery and baggage and 7,000 prisoners in the hands of the victor.

ROSS-CHURCH, Florence M. See supplement.

ROSSE, William Parsons, earl of, a British astronomer, born in York, June 17, 1800, died at Parsonstown, Ireland, Oct. 31, 1867. He graduated at Magdalen college, Oxford, in 1822. From 1821 to 1834, under the title of Lord Oxmantown, he represented King's county, Ireland, in parliament. At the death of his father in 1841 he succeeded to the peerage, and in 1845 was elected one of the representative peers for Ireland. He voted with the liberal party. In 1826 he erected upon the grounds of his residence, Birr castle, near Parsonstown, an observatory for which instruments were made under his special direction. The most important was the enormous reflecting telescope, finished about 1844 at a cost of about \$60,000; it has an aperture of 6 ft. and a focus of 53 ft., and is now the most powerful reflector in the world as far as great space-penetrating capacity is concerned. It has been of especial use in resolving nebulae, for which it was in great measure designed. In 1843 Lord Rosse was made president of

the British association. He was elected to the astronomical society in 1824, and to the royal society in 1831. From 1849 to 1854 he was president of the royal society. During the last six years of his life he was chancellor of Trinity college, Dublin.

ROSSEL, Louis Nathaniel, a French soldier, born in St. Brieuc, department of Côtes-du-Nord, in 1844, shot at Satory, near Versailles, Nov. 28, 1871. He graduated at the school of engineers in Paris, and became first lieutenant in 1860. In 1870, while on the staff of the commander of the city of Metz, he conspired against Bazaine, who had him arrested. He fell into the hands of the Germans, but escaped and was made colonel by Gambetta, took part in the campaign of the Loire, and next organized the camp of Nevers. He resigned to join the commune, and was made chief engineer of a legion, but was arrested after the disastrous operations of April 2-3. He was released at the instance of Cluseret, who placed him at the head of his staff, and whom he succeeded on May 1 as delegate for war; but in less than ten days he tendered his resignation in a letter in which he severely criticised the commune. He was again arrested, and escaped only to be captured by the Versailles troops. After several trials he was executed despite the general sympathy that was expressed for him at home and abroad. A select edition of his writings (*Papiers posthumes*) was edited by Jules Amigues (Paris, 1871; English translation, London, 1872). His biography has been written by M. E. Gerspach (Paris, 1873).

ROSSETTI, I. Gabriele, an Italian poet, born in the Abruzzi, March 1, 1783, died in London, April 26, 1854. He was director of the museum of Naples from 1814 to 1821, when he was exiled, and in 1824 he settled in England. He was professor of Italian literature at King's college, London, from 1831 to 1845, when he became blind and resigned his chair. He published *Commento analitico sulla Divina Commedia* (1826-'7); *Sullo spirito antipapale* (1832); *Il mistero dell'amor platonico svelato* (1840); and *La Beatrice del Dante*. According to his theory, Dante and his contemporaries adopted a peculiar idiom to veil their aversion for the papacy, and introduced a woman as the special object of their adoration to symbolize true Christianity. Rossetti's poetical works include *Dio e l'uomo* (1840), *Il veggente in solitudine* (1843), *Poesie* (1847), and *L'Arpa evangelica* (1852). **II. Dante Gabriel**, an English artist, son of the preceding, born in London in 1828. He studied at King's college, London, and contributed designs to an illustrated edition of Tennyson's poems. In 1849 he exhibited "The Girlhood of the Virgin," a picture in the pre-Raphaelite style, of which he was one of the earliest promoters, and in 1858 at the Liverpool academy three water-color paintings entitled "A Christmas Carol," "The Wedding of St. George," and

"Dante's Dream on the Day of the Death of Beatrice." His "Fair Rosamond" was exhibited at the Scottish academy in 1860. He has published "The Early Italian Poets," translations from Dante and his predecessors (London, 1861; revised ed., "Dante and his Circle," 1874), and "Poems" (1870). **III. Christina Gabriella**, an English poetess, sister of the preceding, born in London in December, 1830. Her publications are: "Goblin Market, and other Poems" (1862); "The Prince's Progress, and other Poems" (1866); "Commonplace, and other short Stories in Prose" (1870); "Sing-Song, a Nursery Rhyme Book" (1872); and "Speaking Likenesses" and "Annus Domini" (1874). **IV. William M.** See supplement.

ROSSI, Giovanni Battista de', an Italian archæologist, born in Rome, Feb. 23, 1822. He became celebrated by his discoveries in the catacombs, an account of which he is publishing in two works. The first is to be a complete collection of all the Christian inscriptions, amounting to more than 11,000, of which a folio volume, containing 1,374, appeared in 1861, entitled *Inscriptiones Christianæ Urbis Romæ septimo sæculo antiquiores*; the other is a general work called *Roma sotterranea cristiana*, of which vol. i. appeared in 1866. He is also editor of the *Bollettino di Archeologia*.

ROSSI, Pellegrino, count, an Italian statesman, born in Carrara, July 13, 1787, assassinated in Rome, Nov. 15, 1848. Until the overthrow of the French rule in Italy he taught law at Bologna. Removing to Geneva in 1814, he became professor of law there, and a member of the council and of the diet, where he advocated centralization. While on a mission in Paris he found a patron in Guizot, and in 1834 received the chair of political economy in the collège de France and of public law in the faculty of law. Louis Philippe made him a peer in 1839, and in 1845 sent him as ambassador to Rome. He first favored and then, by order of Louis Philippe, endeavored to check the reformatory policy of Pius IX. During the revolution of 1848 the pope appointed him prime minister (Sept. 16), and he aimed to establish a confederation of Italian states. While going to attend the opening of parliament, he was surrounded by a crowd, and killed with a stiletto. His principal work is a *Traité du droit pénal* (3 vols., Paris, 1829).

ROSSINI, Gioacchino, an Italian composer, born in Pesaro, Feb. 29, 1792, died in Paris, Nov. 13, 1868. His parents were members of a strolling operatic company, and at 10 years of age he played the second horn in the orchestra, his father playing the first. Soon afterward he was placed with Angelo Tesei, a music teacher in Bologna, under whose instructions he developed a soprano voice of great purity and compass; and at 14 he was able to sing at sight any piece of music placed before him. After being for several years a chorister in the Bolognese churches, and occasionally chorus master in provincial theatres, he was induced in

1807 by the breaking of his voice to enter the lyceum of Bologna, where he was instructed in counterpoint by the abbate Mattei. Hearing his master say that simple counterpoint would suffice for ordinary stage composition, he left the school, studied the works of the principal opera writers, giving especial attention to Mozart, and at 18 years of age, having tried his hand at some minor pieces, produced his first dramatic work, *La cambiale di matrimonio*, an operetta performed with moderate success at the theatre San Mosè in Venice. His *Demetrio e Polibio*, produced in Rome in 1811, is said to have been written two years earlier. In 1812 he composed five operas, all of which, with the exception of *L'Inganno felice*, speedily sank into oblivion. In the succeeding year he appeared before the Venetians with three operas, one of which, *Tancredi*, excited an enthusiasm almost without a parallel in the history of music, and within three years found its way into every musical theatre of Europe and America. Of the remaining operas composed in 1813, *L'Italiana in Algeri* was almost equally successful, and with *Tancredi* still holds possession of the stage. In the following year he produced at Milan *Aureliano in Palmira* and *Il Turco in Italia*, the latter of which is still frequently performed; and in 1815 *Elisabetta regina d'Inghilterra* for the San Carlo theatre of Naples, where he also accepted an engagement as musical director. In 1816 his *Barbiere di Siviglia*, probably the most admirable specimen of the Italian *opera buffa* in existence, was performed in Rome during the carnival with a success which, after the lapse of more than half a century, has suffered no diminution. According to Manuel Garcia, for whom the *Barbiere* was written, the greater part of it was composed in eight days. In 1816-17 he composed for the San Carlo and other theatres seven or more operas, three of which, *Otello*, *La Cenerentola*, and *La gazza ladra*, are yet standard favorites—the first a striking example of his forcible style, and the second of his skill in producing florid embellishments. His *Mosè in Egitto* (1818) ranks among the author's finest serious compositions. Within the next few years were produced *La donna del lago*, *Maometto Secondo*, *Zelmira*, and a number of minor works, showing a gradual increase of power in harmony and instrumental effects, with no loss of melodic beauty. In 1821 he married Mlle. Colbran, prima donna at the San Carlo, for whom many of his parts were written. With her he went the same year to Vienna to direct the production of his *Zelmira*, in which his wife took part. Returning to Venice in 1823, he took leave of the Italian stage with the opera *Semiramide*, the most elaborate of his works up to that period. In 1824 he visited London with his wife under an engagement to compose an opera for the king's theatre. An indolent carelessness now took the place of his former activity, he neglected his duties, failed to produce his

promised opera, and made the season ruinous to the lessees of the theatre. But his visit was profitable to himself, and he left England with £10,000, derived principally from concerts arranged for him by the leaders of fashionable society at enormous prices of admission. Going to Paris, he accepted the post of director of the Italian opera, an office which he held till 1830, with little increase of professional celebrity, but with considerable profit. For three years he composed nothing new except a slight piece called *Il viaggio a Rheims*, a portion of which was reproduced in a graceful French opera entitled *Le comte Ory*; but several of his former works were brought out with success, including his *Maometto* under the title of *Le siège de Corinthe*. In 1829 he produced *Guillaume Tell*, generally considered his masterpiece in serious composition, a work abounding in beautiful melodies and in rich and varied instrumentation, but so different in style from any of his previous operas that it seems the creation of another mind. With this work, at the age of 37 and in the prime of his powers, he voluntarily closed his career as a dramatic composer; and for many years he wrote nothing with the exception of his *Stabat Mater*, a pleasing composition, but rather operatic than ecclesiastical. During his residence in Paris he was appointed by Charles X. inspector general of singing, with a liberal salary, from the enjoyment of which he was cut off by the revolution of 1830. He still remained several years in Paris, claiming compensation for losses he had sustained, and in 1836 retired to an elegant villa near Bologna, where for nearly 20 years he principally resided, refusing the most tempting offers to write for the stage, on the ground that he was unwilling to endanger his reputation by the production of inferior works. Disturbed by the revolutionary excitements of 1848, he retired to Florence, but in 1855 returned to Paris, where he chiefly resided till his death. During this interval he composed but one work of importance, his *Messe solennelle*, which he wrote in 1863 and scored for orchestra in 1865. It was first performed at the Théâtre Italien in Paris, Feb. 28, 1869. He was buried in Père Lachaise. He left a widow, his second wife. His operas number about 40. He also wrote cantatas, hymns, and miscellaneous vocal and instrumental pieces. A number of his posthumous pianoforte compositions were sold in 1873 by his widow to Baron Grant, who proposes to publish them in England and to devote the proceeds to the establishment of a prize at the musical academy in London. His larger dramatic compositions, on which his fame chiefly rests, illustrate the richness and variety of his melodic invention, his consummate skill in writing for the voice, and the intimate and natural association of florid ornament with the body of the music, which constitutes his peculiar style.—Many biographies of Rossini have been written, among them the following: *Ros-*

sini e la sua musica, by Bettoni (Milan, 1824); *Vie de Rossini*, by Beyle, under the *nom de plume* of Stendhal (Paris, 1823-'4); *Rossini, sa vie et ses œuvres*, by Azevedo (Paris, 1865); "Life of Rossini," by Edwards (London, 1869); *Della vita e delle opere di Gioacchino Rossini*, by Silvestri (Milan, 1875); and a life by A. Ganolini (Bologna, 1875).

ROSTAN, Louis Léon, a French surgeon, born at St. Maximin, department of Var, March 16, 1790, died Oct. 4, 1866. He graduated in medicine at Paris in 1812, and was from 1833 professor in the faculty of medicine, with a chair of clinical medicine at the Hôtel-Dieu. His principal works are: *Recherches sur le ramollissement du cerveau* (1819; 2d ed., 1823); *Traité élémentaire de diagnostic* (3 vols. 8vo, 1826-'7; 2d ed., 1829); *Cours élémentaire d'hygiène* (2 vols., 1828; 2d ed., 1838); and *Exposition des principes de l'organicisme* (1846; 3d ed., 1864). He also published important papers on rupture of the heart, the distinction of aneurisms, transposition of the viscera, spontaneous fracture of the femur, &c.

ROSTOCK, a fortified town of Mecklenburg-Schwerin, on the left bank of the Warnow, about 9 m. above its mouth in the Baltic sea, and 95 m. N. E. of Hamburg; pop. in 1871, 30,980. It has a university founded in 1419, which in 1874 had 34 professors and teachers and 135 students, with a library of 80,000 volumes. There are also a school of navigation, a gymnasium, a botanic garden, and various literary and charitable institutions. Rostock is a place of great antiquity; in the middle ages it was a member of the Hanseatic league, and its commerce is still very extensive.

ROSTOPTCHIN, Fedor, count, a Russian soldier, born in the government of Orel about 1765, died in Moscow in January or February, 1826. He became a page of Catharine II. and a favorite of Paul I., under whom he was minister of foreign affairs, and received the title of count. Opposed to an alliance with France, and frequently subjected to the caprices of Paul, he was absent from St. Petersburg at the time of his violent death (1801). In 1810 Alexander I. made him grand chamberlain, and in 1812 military governor of Moscow. He displayed much activity in organizing volunteer corps; and when against his opinion the evacuation of Moscow was decided upon after the battle of Borodino, he withdrew with the whole army and the population, leaving for the French a deserted city. He set fire to his own suburban palace, but in his *La vérité sur l'incendie de Moscou* (Paris, 1823), he denies having burned the city, though he is generally regarded as the author of the conflagration. Despite his great services, he was removed in 1814 from the governorship of Moscow, and resided till 1823 in Paris, where his daughter married the count Eugène de Ségur. An incomplete edition of his works appeared in Paris in 1853. One of his sons published a universal history in French.—See *Rostoptchine*

et Koutousof, ou la Russie en 1812, by Schnitzler (Paris, 1863).

ROTH, Rudolf, a German orientalist, born in Stuttgart, April 3, 1821. He studied in Tübingen, Berlin, Paris, and London, and became in 1856 professor of oriental languages at Tübingen. He has published *Zur Literatur und Geschichte des Veda* (1846); an edition of Yaska's *Nirukta* (1852); the *Atharva Veda*, in conjunction with Prof. W. D. Whitney (1856-'7); *Ueber den Mythos von den fünf Menschengeschlechtern* (1860); and *Ueber die Vorstellung vom Schicksal in der indischen Sprachweisheit* (1866). His principal work is a large Sanskrit dictionary, prepared in conjunction with Böhtlingk, and published by the St. Petersburg academy of sciences (1853-'75).

ROTHE, Richard, a German theologian, born in Posen, Jan. 28, 1799, died in Heidelberg, Aug. 20, 1867. He studied theology in Heidelberg, Berlin, and Wittenberg, was chaplain of the Prussian embassy in Rome for five years, became a professor in the Wittenberg theological seminary and its director, conducted a theological seminary at Heidelberg for twelve years, and was a professor of theology in Bonn and Heidelberg. His religious views are tinged with the philosophy of Schleiermacher and Hegel. He published *Die Anfänge der christlichen Kirche und ihre Verfassung* (1837); *Zur Dogmatik* (1863); and *Theologische Ethik* (3 vols., 1845-'8). A revised edition of the *Ethik* by Holtzmann (5 vols., 1867-'71) contains the author's posthumous notes. His university lectures on dogmatics (*Dogmatik*, 1870), a collection of essays (*Stille Stunden*, 1872), and his lectures on church history, edited by Weingarten (1875), have appeared since his death. The best account of his life is Nippold's *Richard Rothe, ein christliches Leben auf Grund der Briefe Rothe's* (Wittenberg, 1873).

ROTHERMEL, Peter F., an American painter, born in Luzerne co., Pa., July 8, 1817. He was educated as a land surveyor, studied painting, and about 1840 commenced practice as a portrait painter. In 1856-'7 he visited France, Germany, and Italy, and painted his "St. Agnes," now in St. Petersburg, and "The Foscari." Some of his best known paintings are "De Soto discovering the Mississippi," "Columbus before Isabella the Catholic," the "Noche Triste," from Prescott's "Conquest of Mexico," "Patrick Henry before the Virginia House of Burgesses," "Christian Martyns in the Colosseum," and "The Battle of Gettysburg," in the state capital at Harrisburg.

ROTHERSAY, a town of Scotland, capital of Buteshire, at the head of Rothersay bay on the E. side of the island of Bute, 30 m. W. of Glasgow; pop. in 1871, 7,800. It has a good harbor. The houses are built of greenstone, and in the suburbs are numerous villas and gardens. There are ship-building yards, tanneries, a distillery, and a cotton mill, and many of the inhabitants are employed in fishing and

coasting. It has lately become a watering place and a resort for consumptive patients. The ancient castle of Rothersay, now in ruins (having been burnt by the duke of Argyle in 1685), was given by Robert III., who died in it, to his son David, with the title of duke of Rothersay, which the prince of Wales still holds.

ROTHSCHILD, Mayer Anselm, a German banker, born in Frankfort in 1743, died there in September, 1812. He belonged to a poor Jewish family, and was a clerk in Hanover before establishing himself at Frankfort, where his integrity and ability brought him into relations with German governments, and particularly with that of Hesse-Cassel. The elector William, on his flight in 1806 after the invasion of his states by the French, deposited about \$5,000,000 for safe keeping with Rothschild for eight years without interest, and subsequently received from his heirs an annual interest of 2 per cent., the capital being repaid to the elector's son and successor in 1823. The judicious investment of this capital was the source of the colossal fortune of the Rothschilds. Mayer Anselm's five sons, Anselm, Solomon, Nathan, Charles, and James, respectively became chiefs of houses at Frankfort, Vienna, London, Naples, and Paris, and all were made barons by the emperor Francis; and they acquired world-wide celebrity by making loans to governments and by other financial and mercantile operations. The firm is continued by members of the family at all these places excepting Naples, the London and Paris houses being the most important; and special agents of the firm are established in all parts of the world. The eldest son of the London Rothschild, Lionel Nathan, the present head of the firm (1875), was elected to parliament from the city of London in 1847. He declined to take the customary oath "on the true faith of a Christian," and did not take his seat, although regularly reelected, until the removal of the disabilities of the Jews in 1858. He was the first Jew that ever sat in the house of commons.

ROTIFERA. See ANIMALCULES, vol. i., p. 517.

ROTTECK, Karl von, a German historian, born in Freiburg, Baden, July 18, 1775, died there, Nov. 26, 1840. He was professor of history at Freiburg from 1798 to 1818, and subsequently of political science, and long represented the university in the first constitutional assembly of Baden, where he advocated the liberty of the press. This displeased the authorities, who stopped the journal *Der Freisinnige*, of which he was an editor, and in 1832 removed him from his professorship. He was repeatedly elected burgomaster, but did not serve. His monument at Freiburg, erected in 1848, was removed in 1849 and reerected in 1862. His principal work is *Allgemeine Geschichte* (9 vols., Freiburg, 1813-'27), continued by Steger and Hermes to 11 vols. (25th ed., Brunswick, 1866 *et seq.*). Several translations of this work and of an abridgment (4 vols.,

Stuttgart, 1830-'34; 7th ed., 6 vols., 1860-'61) have appeared, including one of the latter by T. Jones (4 vols., Philadelphia, 1840, reprinted in London). Conjointly with Welcker, Rotteck began to publish the *Staatslexikon* (12 vols., Altona, 1834-'44; 3d ed., 14 vols., Leipzig, 1856-'66).

ROTTERDAM, a city of the Netherlands, in the province of South Holland, on the Maas, 18 m. from the sea and 36 m. S. W. of Amsterdam; pop. in 1870, 116,232; in 1873 (estimated), 125,893. It is remarkable for its canals, the most recent being the Nieuwe Singel. The finest quay (Boompjes) is lined with trees and many new buildings and piers. On the Groote Markt (great square) is a bronze statue of Erasmus. There are about 15 places of worship, the largest being the *groote kerk* or great church of St. Lawrence. Rotterdam has a famous Latin school, a school of navigation, an industrial school, and a number of other literary and charitable institutions. The most notable public buildings are the exchange, the museum, and the zoological garden, one of the best in Europe. The finest promenade is the New park. The annual fair begins on the second Monday in August and lasts a week, during which the city presents a scene of uproar and revelry. Rotterdam was formerly a favorite resort of English tourists and adventurers. The improved navigation of the Rhine and traffic by railway and steamers have greatly increased its trade, and there are new docks and other improvements, including new water works completed in 1872. A ship canal has recently been constructed from Rotterdam to Maassluis, through which nearly 900 vessels passed between March and December, 1872. The Moerdijk railway bridge, finished in 1871, one of the longest in Europe, carries the railway to Fyen-oord, opposite Rotterdam, where are extensive ship yards and new docks and warehouses. The total number of vessels entering the port in 1872 was 3,710, tonnage 1,433,895, including 2,406 steamers, tonnage 1,105,427. The exports from Rotterdam to the United States in that year were valued at \$1,104,033. Large quantities of refined petroleum are imported, and the imports of cotton in 1871 amounted to 115,595 bales. A direct steamship line from Rotterdam to New York was established in October, 1872. There are cotton factories, sugar refineries, brandy distilleries, and other manufactures.—Rotterdam received a town charter in 1272. A great fire occurred in 1563, and the town suffered considerably during the struggle with the Spaniards. In 1580 it had a vote in the states of Holland, and its progress has been remarkable ever since, especially within the past 15 years.

ROUARIE, Armand Taffin, marquis de la, a French soldier, born near Rennes in 1756, died near Lamballe, Jan. 30, 1793. He entered the army young, was dismissed from the king's guard in consequence of a duel, came to America, and received from congress a com-

mission as colonel under the name of Charles Armand. He served under Gen. Gates against Cornwallis, having before done various sorts of duty in New Jersey, New York, and Connecticut. In 1781 he visited France on business for the army, but returned in time to take part in the operations before Yorktown in October. In 1783 he received the rank of brigadier general, and in 1784 returned to France. In 1788 he was one of twelve deputies sent to Paris by Brittany to demand the preservation of the privileges of that province, and was imprisoned in the Bastille. With the approval of the king's brothers, he became in 1791 the head of a secret organization spread over Brittany, Anjou, and Poitou, to act in conjunction with the army of the allies. The design was betrayed, and Rouarie became a fugitive; and for several months before his death he directed from his various retreats the preparations for revolt.

ROUBAIX, a town of France, in the department of Le Nord, 6 m. N. E. of Lille; pop. in 1872, 75,987. The population in 1800 was only 8,700, and in 1834 18,187, the rapid increase being due to that of the manufactures of woollen, silk, and cotton goods, known as "Roubaix articles." Linen yarns, shawls, cloth, carpets, and other goods are also made, the annual value of all the manufactures exceeding 150,000,000 francs. The Roubaix or La Marcq canal, 15 m. long, commences near Marquette and joins the Scheldt in Belgium.

ROUBILIAC, Louis François, a French sculptor, born in Lyons about 1695, died in London, Jan. 11, 1762. After completing his studies at the academy in Paris, he settled in England, where he was patronized by the Walpole family. His works include monuments of the duke of Argyll and Handel in Westminster abbey, a statue of Shakespeare for Garrick, who bequeathed it to the British museum, and one of Newton at Trinity college, Cambridge.

ROUEN (anc. *Rotomagus*), a city of France, capital of the department of Seine-Inférieure, on the right bank of the Seine, 67 m. N. W. of Paris; pop. in 1872, 102,470. It stands on a gentle acclivity sloping toward the south, and is connected with its suburb St. Sever, on the opposite side of the river, by three bridges. Ramparts formerly extended round Rouen on the land side, and their site is now occupied by boulevards bordered with shade trees. The Place Royale is the principal square; the others are all small; that of La Pucelle contains a statue of the maid of Orleans. The cathedral of Notre Dame, constructed chiefly in the 13th and 16th centuries, is 484 ft. long and 103 ft. broad, with transepts 174 ft. in length, and the nave is 89 ft. high. The front is richly ornamented, and has three fine portals flanked by lofty towers. The central tower at the intersection of the nave and transept is surmounted by an iron spire nearly 470 ft. high. The decorations are very elaborate and profuse. The interior is lighted by 130 windows. It contains

many tombs, including that of Richard Cœur de Lion. Near the cathedral is the abbey church of St. Ouen, supposed to be one of the most perfect Gothic edifices in the world. It has a tower 260 ft. high, composed of open arches and tracery and terminating in a crown of *fleurs de lis*. Rouen is the seat of an archbishop, and of a Protestant and an Israelite consistory, and has a faculty of Catholic theology and a large theological seminary, a museum rich in masterpieces of painting, a library of 120,000 volumes, an academy of science and arts, and several special schools. Among the public monuments is that of Corneille, who was born here. Rouen is the chief seat of French cotton manufacture. Ship building is carried on.—Under the Romans Rotomagus was the capital of Gallia Lugdunensis Secunda. In the 3d century it was made the see of a bishop, and afterward was successively the capital of Neustria and of the duchy of Normandy. In 1204 Philip Augustus of France took it from John of England, but it was retaken by Henry V. in 1419, and retained by the English till 1449, when it was finally annexed to France. The maid of Orleans was burned here in 1431. Several engagements took place here at the end of 1870, and the Germans occupied the city from Dec. 5, 1870, till July 22, 1871.

ROUGE. I. A pink cosmetic for the cheeks. Varieties are prepared from carmine and from the dried leaves of the safflower or carthamus. The latter furnish the delicate sort known as vegetable rouge. The leaves, thoroughly washed, are dried, and then pulverized and digested in a weak solution of carbonate of soda. Into this is placed some finely carded cotton, and the alkaline mixture is neutralized with lemon juice or vinegar. The red coloring matter collects on the cotton, and this being washed with water to remove the yellow matter, the rouge is again dissolved, and some finely pulverized talc is introduced into the solution before it is again precipitated with the acid. Upon this the red color is received, and when separated from the liquid the two are thoroughly mixed by trituration, a little olive oil being rubbed in to add to the smoothness. Sometimes woollen threads are placed in the second solution to receive the rouge when it is precipitated, and these, called *crepons*, are used to rub the color upon the cheeks. For further accounts of this coloring material, see **CARMINE**, **COCHINEal**, and **SAFFLOWER**. II. In the arts, a pigment known as English red, also used as a polishing powder, made with peroxide of iron. As the perfection of the specula of telescopes depends upon the fineness and efficiency of the rouge used for polishing them, the preparation of this article has received much attention from scientific men, and various processes are employed to insure its greatest purity. Lord Rosse gives the following as his method. The peroxide of iron is precipitated by ammonia from a pure dilute solution of sulphate of iron, and the

precipitate after being washed is compressed under a screw press until nearly dry, and then exposed to a heat which in the dark appears only of a dull low red. The color thus obtained should be a bright crimson inclining to yellow. If potash or soda is used instead of ammonia to precipitate the oxide of iron, a trace of the alkali always remains, injuring the polishing property of the rouge.

ROUGE, Olivier Charles Camille Emmanuel de, viscount, a French Egyptologist, born in Paris, April 11, 1811, died there in December, 1872, or January, 1873. He was professor of archæology in the collège de France, and one of the editors of the *Revue archéologique*. He published *L'Examen de l'ouvrage de M. Bunsen* (1846); *Sur les éléments de l'écriture démotique* (1848); *Mémoire sur l'inscription du tombeau d'Ahmès* (1849); *Notice sommaire des monuments égyptiens exposés dans les galeries du musée du Louvre* (1849); *Mémoire sur la statuette naophore du Vatican* (1851); *Explication d'une inscription égyptienne, prouvant que les anciens égyptiens ont connu la génération éternelle du Fils de Dieu* (1851); *Notes sur les noms égyptiens des planètes* (1856); *Le poème de Pen-ta-Our* (1856); *Le roman des deux frères* (1856); *Étude sur une stèle égyptienne* (1858); *Étude sur le rituel funéraire* (1860); *Monuments du règne de Toutmès III.* (1861); an edition of the Egyptian "Book of the Dead" (1861-'3); *Inscription historique du roi Pianchi-Mériamoun* (1863); *Recherches sur les monuments qu'on peut attribuer aux six premières dynasties de Manéthon* (1866); *Chrestomathie égyptienne* (1867-'8); and *Moïse et les Hébreux d'après les monuments égyptiens* (1869).

ROUGET, Georges, a French painter, born in Paris in 1781, died in 1869. He assisted David in many of his celebrated works, and copied his "Coronation of Napoleon" so faithfully that his picture has been sold as the original. Among his best known works are "The Death of St. Louis," "Francis I. pardoning the Insurgents of La Rochelle," "Henry IV. at the Siege of Paris," "The Abjuration of Henry IV.," "The Marriage of Napoleon and Maria Louisa," and "The Death of Napoleon."

ROUGE ET NOIR (Fr., red and black), *Trente et un* (thirty-one), or *Trente et Quarante* (thirty and forty), a game of chance played with cards upon a table marked with two large spots of red and black (whence the name), of a diamond shape, placed opposite to each other. The banker, or *tailleur* (dealer), who represents him, having shuffled six packs of cards together, draws as many cards as will, counted by their points (the ace counting 1, the court cards 10 each, and the others according to their number of spots), amount to at least 31; so that if he should happen to count only 30, he must still draw another card. The whole number of cards drawn must be more than 30 and not more than 40. These he places in one row or parcel, and designates as *noir*; and he

immediately afterward draws in the same manner another parcel of cards for the *rouge*. The players, who play against the *tailleur*, and whose number may be unlimited, have previously placed their stakes on the red or black spots upon the table, and as the *rouge* or the *noir* parcel of cards amounts to 31 or approaches nearest to it, they win or lose; *i. e.*, if the *rouge* counts for example 32 and the *noir* 33 or more, the money placed upon the red wins. When the *tailleur* deals to the second or *rouge* parcel of cards the same number he has turned up in the *noir*, it is called a *refait*, and another deal must be had. There are two other chances, called *couleur* and *inverse*, which are determined by the color of the first card turned up and the success of *rouge* or *noir*; those playing on the *couleur* winning if the first card dealt is of the successful color, and those on the *inverse* if the contrary. This game, with roulette, was forbidden by law in France in 1838.

ROUHER, Eugène, a French politician, born in Riom, Nov. 30, 1814. He became an advocate, and was returned in 1848 to the constituent, and in 1849 to the legislative assembly. He was minister of justice under Louis Napoleon as president from Oct. 31 of the same year to January, 1851, again from April till October, and from Dec. 2 till the confiscation of the Orleans estates (Jan. 22, 1852), which he assigned as a motive for his resignation; but a few days afterward he returned to office as vice president of the council of state. In February, 1855, he became minister of agriculture, commerce, and public works; in June, 1856, he was made a senator; and he was president of the council of state from Oct. 18, 1863, till Jan. 19, 1867, when he resigned in consequence of the emperor's announcement of a more liberal policy; but he was at once reinstated as the head of the cabinet with the additional portfolio of the finances, and remained in office till July 13, 1869, a few days after which date he was appointed president of the senate. He was identified with all the foreign and internal affairs which proved fatal to the second empire, and after its downfall (Sept. 4, 1870) he fled. When he ventured to return to France he was a short time under arrest; yet he was elected to the assembly at Versailles in February, 1872, and continued to be a member of it in 1875 as a champion of Napoleon IV.

ROULETTE (Fr., a little wheel), a game of chance, which from the end of the 18th century till 1838, when it was forbidden by law, was the principal gambling game in Paris. It was the leading game in the German spas till public gambling was abolished in 1873, is still popular in Italy, and is played to some extent in Great Britain and the United States. It is played on a cloth-covered oblong table, in the centre of which is a round cavity having several copper bands around its sides at equal distances from each other. The sides are fixed, but the bottom is movable round an

axis in the centre of the cavity, and around its circumference are 38 holes painted black and red alternately, and numbered from 1 to 36, with two zeros marked 0 and 00. These numbers and zeros are painted on the green cloth, and on the margin of the table are the words *impair*, *manque*, *rouge*, *pair*, *passee*, and *noir*. The manager turns the wheel, at the same time throwing into the cavity in an opposite direction to the movement given to the movable bottom an ivory ball, which when the revolution ceases falls into one of the numbered cells. The player stakes his money upon one or more numbers, and if the ball falls into the corresponding number or zero, he receives for one number his stake and 35 times more, for two numbers 18 times more, for three numbers 12 times more, and so on, the gain being less as the risk is reduced. If the player stakes upon a column, or 12 numbers, and the ball enters a cell corresponding to one of them, he wins three times the amount of his risk. Or he may stake upon an even number (*pair*), an odd number (*impair*), from 1 to 18 inclusive (*manque*), from 19 to 36 inclusive (*passee*), or upon the colors *rouge* and *noir*. If he ventures upon these six chances and the ball falls into either of the zeros, the stakes may be divided between the banker and the player, or may be "put into prison" for another trial to determine to whom they belong. Some tables have but a single zero, and with 37 cells the amount returned to the winners is but 35 to 1, the bank gaining the difference; with two zeros, the advantage of the bank is proportionately greater; and with the divided chances on *pair*, *impair*, &c., the steady gain of the bank is almost certain, and is estimated at 4 per cent. on all the money staked. In American roulette a 28 instead of 36 table is often used, the banker paying the winner but 27 for 1, thus giving a greater percentage against the player.

ROUM. See SELJUKS.

ROUMANIA, a state of S. E. Europe, tributary to Turkey, consisting of the united Danubian principalities Wallachia and Moldavia (including that portion of Bessarabia which was annexed from Russia in 1856), situated between lat. 43° 38' and 48° 16' N., and lon. 22° 20' and 30° 15' E. It is bounded by Hungary, Transylvania, Bukovina, the Russian province of Bessarabia, the Black sea, Bulgaria, and Servia; area, 46,708 sq. m.; pop. about 4,500,000, mainly Roumans, but including many eastern and European nationalities, besides about 150,000 Jews and 200,000 gypsies; capital, Bucharest. (For a description of the physical geography, see MOLDAVIA, and WALLACHIA; see also WALLACHIAN LANGUAGE AND LITERATURE.) About two thirds of the population depend on agriculture and cattle breeding. The soil is very fertile, and yields rich harvests, but of the total area only 68·7 per cent. is productive, comprising 20·4 per cent. in farm, garden, and wine land, 7·6 per

cent. meadows, 16.6 per cent. forests, and 24.1 per cent. pastures. The chief agricultural products are corn, average yield about 122,000,000 bushels; flax and hemp, 480,000 cwt.; tobacco, 10,000 cwt.; and wine, 39,000,000 gallons. The number of cattle in 1873 was 3,600,000, of horses 600,000, of hogs 1,200,000, and of sheep 5,000,000. Rock salt, a monopoly of the state, abounds in the Carpathian mountains; the annual yield is about 1,370,000 cwt. Much petroleum is also produced. In 1872 the imports amounted to \$16,400,000, and the exports, chiefly grain and flour, to \$30,700,000. The principal ports are Galatz and Braila. The aggregate movement of shipping at all the Roumanian ports in 1873 was 13,003 arrivals, tonnage 1,818,371, and 12,772 departures, tonnage 1,764,377. The aggregate length of railways in 1874 was 600 m.—The constitution of Roumania is a limited monarchy, the head of which bears the title of prince, with male succession. The legislative body consists of a senate and a chamber of deputies. The senate consists of the heir to the throne, the metropolitans and eparchial bishops, representatives of the universities of Bucharest and Jassy, deputies of the large holders of real estate, and 33 chosen by the towns paying the highest amount of taxes. The chamber of deputies consists of 157 members, 82 for Wallachia and 75 for Moldavia. The deputies are chosen for four years, the senators for eight years; the former must have completed their 25th, the latter their 40th year. Every tax payer has the right to vote; but the electors are divided into several groups, one of which, containing the lowest tax payers, chooses its deputies by indirect election (through electors), while the others vote directly. Each of the two chambers elects its own president; the sessions are public. In 1874 the ministry consisted of the departments of the interior, finances, war, foreign affairs, justice, agriculture, commerce and public works, and public instruction and worship. The minister of the interior was president of the council. For administration purposes the country is divided into 33 districts, each of which has a prefect and an elective district council; the districts are divided into 162 sub-districts, at the head of which are subprefects. Every commune has an elective communal council; the heads of communes are elected in the rural communities by the people, and in the cities are appointed by the prince. The judiciary, as reorganized in 1865, includes the court of cassation in Bucharest, the courts of appeal in Bucharest, Jassy, Krayova, and Fokshani, the courts of assizes for criminal affairs, 32 tribunals of justice, and local courts. The finances are in an unsettled condition, and the annual deficits are much larger than is apparent from the official records. The budget for 1875 estimated the expenditures at \$18,700,000, and the revenue at only \$17,600,000. An increased revenue is expected from the tobacco monopoly, which was established in

1872. The public debt in 1874 amounted to \$37,000,000, exclusive of \$3,000,000 in government bank notes. The military forces, reorganized in 1869 and somewhat modified in 1872, consist of four large divisions: 1, the standing army and its reserve; 2, the territorial army and reserve; 3, the militia; 4, the civic guard of the towns and the *gloata* (general levy) of the rural communities. The territorial army comprises those from 21 to 29 years of age who are not drafted for the annual contingent. The militia comprises all from 21 to 37 years who have not been called to either the standing or the territorial army, or have completed their service in either. The fourth division, comprising men from 37 to 46 (in the cities, from 36 to 45), is only called out for the defence of the country. The standing and territorial armies in time of peace number about 60,000; on the war footing, 95,000. The total active national force, including the militia, is 150,000, without the fourth division, which is not yet fully completed. A cadet force was organized in 1874 in all the public schools.—About 90 per cent. of the people belong to the Greek church, at the head of which are the metropolitan and primate of Roumania at Bucharest, the metropolitan of Moldavia at Jassy, and six bishops. The number of priests is about 9,700; the number of monks and nuns has greatly decreased in consequence of the secularization in 1864 of all monastic property. The Roman Catholics, represented by two vicars, are estimated at from 50,000 to upward of 100,000, and the Protestants from 25,000 to 50,000; there are but few Mohammedans. There are two universities, at Bucharest and Jassy, each with faculties of philosophy and literature, law, medicine, and mathematical and natural sciences. There are eight Greek theological seminaries and one Catholic. The number of town schools in 1873 was 2,616, and of rural schools 1,975.—For the history of the country previous to the union in 1859 of the two principalities under the name of Roumania, see MOLDAVIA, and WALLACHIA. Alexander John I., of the house of Cuza, elected prince of Moldavia on Jan. 17, 1859, and of Wallachia on Feb. 5, obtained the recognition of the sultan in 1860, and on Dec. 23, 1861, formally proclaimed the permanent union of the two principalities. He was forced to abdicate on Feb. 23, 1866 (see ALEXANDER JOHN I.), and was succeeded by a provisional government. Prince Charles I. of Hohenzollern was elected prince by the people on April 14, and confirmed by the legislature on May 12, and in July took the oath of fidelity to the constitution. His reign has been disturbed by partisan animosities and by financial troubles arising from the failure of the Prussian railway contractor Strousberg to fulfil his obligations in the construction of railways for which the government had given heavy guarantees. In 1871 the Germans at Bucharest celebrated the restoration of peace,

on which occasion there were disturbances. The prime minister, Prince Ghika, was obliged to resign for not preventing them, and Prince Charles himself would have resigned if the people had not urged him to remain. Persecutions of the Jews, who are obnoxious to the poorer classes on account of their great success in trade, led to remonstrances from abroad, and in 1874 municipal rights were granted them, on condition of having attained the grade of under officer in the army, or of producing a diploma of a Roumanian or foreign university, or of owning a manufactory employing not fewer than 50 persons; but as hardly any of the Jews can comply with these conditions, the rights conferred are purely nominal. Roumania pays an annual tribute to Turkey, which in 1874-'75 amounted to \$181,825, of which \$113,650 was for Wallachia, and the rest for Moldavia; but in most other respects the country is virtually independent. Yet in 1875 the sultan and his allies contested with Prince Charles the right of concluding commercial treaties, and Roumania, though diplomatic and consular agents are accredited at Bucharest, is not permitted to appoint ministers at foreign courts. The relations with the Porte are extremely delicate. The relationship of Prince Charles with the emperor of Germany imposes a certain restraint upon the sultan; and while the latter is jealous of maintaining his suzerainty, the Roumanians avail themselves of every opportunity to claim and to exercise sovereign power.

ROUMELIA, *Rumelia*, or *Romania* (Turk. *Rumili*, Roman land), the name formerly applied by the Turks to the largest of their European provinces, comprising their most important possessions in Greece and N. of it as far as the northern ridges of the Balkan, and subsequently applied by them to a territory comprising portions of Albania and Macedonia (capital, Monastir or Bitolia), now embraced in the vilayets of Prisrend and Salonica. By occidental writers the name is generally used to designate the provinces known to the ancients as Macedonia and Thrace, and in a more limited sense to Thrace alone. In this limited sense Roumelia is bounded N. by the Balkan, E. by the Black sea, S. E. and S. by the Bosphorus, the sea of Marmora, and the Grecian archipelago, and W. by the range of the Despoto Dag; it is watered by the Maritza and its affluents the Tundja and Erkeneh, and contains among others the cities of Constantinople, Adrianople, Philippopoli, Rodosto, Gallipoli, and Enos. This country, corresponding to the modern vilayet of Adrianople or Edirneh, which, however, does not embrace Constantinople and the adjoining territory, is the most important portion of the Turkish empire in Europe, although it is principally occupied by Bulgarians and Greeks, and the number of Ottomans is comparatively small. (See THRACE.)

ROUND WORMS. See ENTOZOA, vol. vi., p. 668.

ROUSE'S POINT, a village in the town of Champlain, Clinton co., New York, on the W. shore of Lake Champlain, at the head of the Richelieu river, $\frac{1}{2}$ m. S. of the Canada line, and 21 m. N. by E. of Plattsburgh; pop. in 1870, 1,266. It is at the terminus of a branch of the Grand Trunk railway, and the Central Vermont railroad here crosses the lake on a bridge 1 m. long. There are about 2,000 arrivals and departures of vessels annually. About seven eighths of the revenues of the district of Champlain are collected here, the receipts amounting to \$500,000 a year. Fort Montgomery, guarding the outlet of the lake, is a mile distant. The village contains an extensive publishing house.

ROUSSEAU, Jean Baptiste, a French poet, born in Paris, April 6, 1670, died in Brussels, March 17, 1741. His first play was performed in 1694 with little success, and his last, *Le capricieux*, in 1700, was still less successful. Ascribing his failure to jealous authors, he satirized them with great virulence, and made many enemies; while his contempt for his father because he was a shoemaker gave rise to the poem *Le mérite personnel*, by La Motte, the son of a hatter, who was elected to the academy instead of Rousseau. In 1712 he was sentenced for licentious and slanderous writing, though perhaps unjustly, to perpetual banishment, and went to Switzerland, and subsequently settled in Brussels. He made a fortune by publishing his works in England, but lost it, and was supported by the duke of Arenenberg, who gave him a pension and rooms in his palace. His complete works were published by Amar-Durivier (5 vols., Paris, 1820). The most recent edition of his *Œuvres lyriques* is by Manuel (1852).

ROUSSEAU, Jean Jacques, a French author, born in Geneva, June 28, 1712, died at Ermenonville, near Paris, July 2, 1778. He was descended from a family of Paris booksellers and Protestant refugees. His mother, the daughter of a clergyman, died when he was born, and he afterward mourned her death as the first of his woes. From his father, a watchmaker, he inherited a visionary, restless disposition, and a great fondness for works of fiction. Before he was nine years old he had spent whole nights with him in reading novels and Plutarch's "Lives." He was a sickly boy, and his life was saved only through the care of an aunt. After his father's departure from Geneva he was sent to school in the neighboring village of Boissy; and he afterward lived for several years in the house of his uncle, an engineer in Geneva, and acquired some knowledge of drawing and mathematics. After serving in the office of a lawyer, who dismissed him, he was apprenticed to an engraver, from whom he ran away in 1728. While wandering about penniless, he was relieved from starvation by the proselytizing priest Pontverre of Conignon in Savoy, who presented him to Mme. de Warens at Annecy, a recent convert to

Catholicism. She sent him to the school of catechumens at Turin for his definitive conversion, and he lost no time in nominally going through the ceremony, in order to escape from that institution. But his destitution obliged him to become a lacquey of the countess de Vercellia, and after her death of the count de Gouvion at Turin, who taught him Latin, and with whom his prospects were improving when an old comrade tempted him to lead a roving life, which in the autumn of 1729 ended in his seeking shelter under the roof of Mme. de Warens. She now sent him to a theological seminary at Annecy, from which he was dismissed as unfitted for the priesthood. Finally he took up his abode in her house at Chambéry, and after a severe illness he passed several years with her as her lover in the neighboring farmhouse Les Charmettes. He left her in 1740 in a fit of jealousy, and was a tutor in the family of M. de Mably at Lyons till the autumn of 1741, when he went to Paris. He was absorbed at that time in the study of music, after attempting to teach the art, and he had invented a new system of musical notation, which he submitted in 1742 to the academy of sciences in Paris, under the auspices of Réaumur, but without success. At a later period he published a *Dictionnaire de musique*. He then composed *Les muses galantes*, an opera which was never performed. After recovering from a new attack of illness he was secretary to M. de Montaigu, French ambassador at Venice, for about 18 months, but in 1745 he returned to Paris disgusted with his chief. Here he became acquainted with Mme. d'Épinay, Diderot, Grimm, and D'Holbach. He now lived with Thérèse Le Vasseur, whom he had first met at a squalid hotel where she was a cook. She was coarse but faithful, and bore him five children, who were successively sent to the foundling hospital. Toward the close of his life he took her as his wife, in presence of two witnesses. He struggled with adversity for several years, receiving little or nothing for his musical and literary labors, and only a small income as secretary to Mme. Dupin, and next as cashier, which latter employment filled him with anxiety and nearly ruined his health. In 1750 he received the prize offered by the academy of Dijon for the best disquisition on the question whether the progress of science and the arts has contributed to corrupt or improve the morals of mankind. In his essay he declared war against all civilization, and henceforward he set himself up as a censor and reformer of society, disdaining all the elegancies of life, and attracting attention by his oddities. In 1752 he produced *Le devin du village*, an opera, the artless melody of which won general admiration, and *Lettre sur la musique française*, in favor of Italian music, which exposed him to the animosity of the national school. He caused a still greater sensation by writing in 1753 another essay for the academy of Dijon on

"The Origin of Inequality among Men," in which he attacked the existing social order. He now revisited Geneva, where he was cordially received and regained his citizenship by returning to Calvinism, and would have remained there but for his jealousy of Voltaire, who resided in the vicinity. In 1756 he took up his residence at the Hermitage, a charming retreat which Mme. d'Épinay had fitted up for him and his family in the valley of Montmorency; and here he wrote most of *Julie, ou la Nouvelle Héloïse* (6 vols., 1760), in which he idealized Mme. d'Houdetot, and his *Lettre sur les spectacles*, addressed to D'Alembert. But his love for Mme. d'Houdetot gave umbrage to Mme. d'Épinay, and he in his turn became jealous of the relations of the latter to Grimm, Diderot, and D'Holbach. His domestic life was at the same time made intolerable by the mother of Thérèse, and after many tribulations he was obliged to leave the Hermitage, and retired to Montmorency, where he found friends in the duke and duchess de Luxembourg, who prevailed upon him in May, 1759, to inhabit one of their châteaux. Here he met the prince de Conti, the marchioness de Boufflers, and Malesherbes, the censor of the press. At Montmorency he wrote *Émile* and the *Contrat social*, and collected materials for his *Confessions*. His *Émile, ou de l'éducation*, a visionary work which has been called by Goethe "nature's gospel on education," was printed in Amsterdam at the duke's expense (4 vols., 1762); and being also published in Paris against Rousseau's wishes, it was condemned by the parliament, and he escaped arrest by going to Geneva and thence to the canton of Bern. Expelled everywhere, he finally took refuge in the then Prussian principality of Neuchâtel, where he was befriended by Lord Keith, the governor. His *Contrat social*, in which he proclaimed the principles of universal suffrage and popular sovereignty, appeared in the same year, and made him still more obnoxious to the adversaries of progress. He effectively replied to the fulminations of the archbishop of Paris against *Émile*, and in his *Lettres de la montagne* (1764) to those of the Genevan authorities; but as the departure of Lord Keith from Neuchâtel left him unprotected against the fanaticism of the priests and the populace at Motiers, to which place he had retired, he fled at the end of 1765, intending to visit Berlin, but lingered at Strasburg and other places, where he was well received. Arriving in Paris, he was treated with much distinction, but was not permitted to remain. Early in 1766 he accompanied David Hume to England at his urgent invitation, but soon fell out with him. The correspondence relating to this quarrel was deposited in the British museum in 1874, together with Rousseau's autograph will. He returned to France in May, 1767, and resided in various places till 1770, when he settled in Paris. His health was utterly broken by his imaginary and real fears of his enemies; and

the police having interdicted the readings of his *Confessions* at the house of Mme. d'Épinay, at that lady's own request, he became still more despondent. Early in 1778 he was invited by M. de Girardin to his country seat at Ermenonville, where he ended his life so suddenly that rumors of suicide were circulated, but without sufficient evidence; he probably died from apoplexy. In 1794 his remains were removed to the Pantheon, where a statue of him had been erected; and in 1815 the allied sovereigns honored his memory by exempting Ermenonville from all war taxes.—No writer has been more bitterly denounced than Rousseau, on account of his subversive theories and the errors of his life. But despite his sickly sentimentality, the subtle eloquence of his style is unrivalled in French literature, and his social and political theories, crude and erratic as they were, are redeemed by an all-pervading desire to increase the happiness of the laboring masses, and they paved the way for mighty reforms and revolutions. The most celebrated of his posthumous works is *Les confessions* (4 vols., Geneva, 1782), which like his other writings has been translated into most civilized languages. One of the best complete editions of his works is by Musset-Pathay (23 vols., Paris, 1823-'6); and there are many earlier and later complete and select editions, besides *Œuvres et correspondances inédites*, by G. Streckeisen-Moulton (Paris, 1861). The biography of Rousseau by Musset-Pathay (2 vols., 1821), though superior to preceding ones, has been eclipsed by John Morley's "Rousseau" (2 vols., London, 1873). See also *Rousseau, ses amis et ses ennemis*, by Streckeisen-Moulton (2 vols., Neufchâtel, 1865); *Voltaire et Jean Jacques Rousseau*, by G. Desnoiresterres (Paris, 1875); and *Jean Jacques Rousseau, sa vie et ses ouvrages*, by Saint-Marc Girardin (2 vols., Paris, 1875).

ROUSSEAU, Philippe, a French painter, born in Paris about 1808. He first exhibited landscapes, and subsequently pictures of still life and animals. Among the most remarkable is "The Photographic Ape," with flowers (1866).

With Corot, Daubigny, Dupré and Diaz, he founded the modern French school of landscape painting, of which he is one of the chief glories. Few, if any, have surpassed him in the rendering of atmospheric effects, in the ability to diffuse light and air throughout a landscape, and in the power of communicating to others the deep feelings excited by nature in a highly sensitive organization like his own. The Forest of Fontainebleau, where he spent many years of his life, supplied him with an inexhaustible mine of subjects, which he rendered with rare felicity. Four etchings only by Rousseau are known, and proofs of any of them are very rare.

son administration politique et militaire (4 vols., 1861-'3), and *Correspondance de Louis XV. et du maréchal de Noailles* (2 vols., 1865).

ROUSSILLON, an ancient province of S. France, now forming the greater part of the department of Pyrénées-Orientales. It took its name from the town of Ruscino, afterward called Roscilion, and now Tour de Roussillon. It was taken from the Saracens by Pepin the Short in 759, and was governed by Frankish counts till 1172, when the last of them bequeathed it to Alfonso II. of Aragon. John II. of Aragon ceded it in 1462 to Louis XI. of France as security for borrowed money. Charles VIII. restored it to Ferdinand of Aragon in 1493. Louis XIII. conquered it in 1642, and by the treaty of the Pyrenees in 1659 it was annexed to France.

ROUSSY, Girodet de. See GIRODET-TRIOSON.

ROUVILLE, a S. W. county of Quebec, Canada, bounded N. W. by the Richelieu river; area, 244 sq. m.; pop. in 1871, 17,634, of whom 16,954 were of French origin or descent. It is intersected by the Yamaska river, and by the Stanstead, Shefford, and Chambly, and the Montreal, Chambly, and Sorel railways. Capital, Ste. Marie de Monnoir.

ROVIGO. **I.** A N. E. province of Italy, in Venetia, bordering on Verona, Padua, Venice, the Adriatic, Ferrara, and Mantua; area, 651 sq. m.; pop. in 1872, 200,835. The Po and the Adige are the principal rivers, and there are three other navigable streams and two canals. The chief products are wheat, maize, and other grains, hemp, flax, wines, and wool. Silk culture is increasing. The province is divided into the districts of Adria, Ariano, Badia, Lendinara, Massa, Occhiobello, Polesella, and Rovigo. **II.** A town, capital of the province, on the Adigetto, 35 m. S. W. of Venice; pop. about 10,000. It is surrounded by old walls flanked with towers, and possesses a dilapidated castle. The river, spanned by four bridges, divides the town into two parts, the lower being called San Stefano and the upper San Giustino. In the principal square is a column on which once stood the lion of St. Mark. Besides the fine cathedral, there are 26 churches, but none of them remarkable. It contains also a seminary, a gymnasium, an academy of sciences with a large library, and two theatres. The bishop of Adria usually resides here. The annual fair lasts eight days. Leather and saltpetre are the chief manufactures. The wine of the neighborhood has lost its ancient reputation.

ROVIGO, Duke of. See SAVARY.

ROWAN. **I.** A W. county of North Carolina, bordered partly on the E. by the Yadkin, and N. E. by the South Yadkin; area, about 600 sq. m.; pop. in 1870, 16,810, of whom 5,307 were colored. It has an uneven surface and a generally fertile soil. It is intersected by the Richmond and Danville and the Western North Carolina railroads. The chief productions in 1870 were 126,753 bushels of wheat, 289,400 of Indian corn, 119,132 of oats, 4,142 tons of hay, 520 bales of cotton, 54,810 lbs. of tobacco, 9,699 of wool, 70,104 of butter, and 9,658 gal-

lons of sorghum molasses. There were 2,654 horses, 899 mules and asses, 3,529 milch cows, 4,294 other cattle, 7,669 sheep, and 18,023 swine; 5 manufactories of carriages and wagons, 1 of freight and passenger cars, 1 of chewing tobacco, and 3 wool-carding establishments. Capital, Salisbury. II. A N. E. county of Kentucky, bounded W. by Licking river, and drained by several tributaries of that stream; area, about 500 sq. m.; pop. in 1870, 2,991, of whom 32 were colored. The surface is uneven and hilly, and a large portion of it is covered with forests. The chief productions in 1870 were 2,786 bushels of wheat, 112,040 of Indian corn, 15,950 of oats, 56,275 lbs. of butter, 7,072 of wool, 11,295 of tobacco, and 552 tons of hay. There were 721 horses, 720 milch cows, 1,125 other cattle, 3,521 sheep, and 2,900 swine. Capital, Morehead.

ROWE, Elizabeth, an English authoress, born in Ilchester, Sept. 11, 1674, died at Frome, near Bristol, Feb. 20, 1737. She was the daughter of a dissenting minister named Singer. She published "Poems on Several Occasions, by Philomela" (1696); "Friendship in Death, or Twenty Letters from the Dead to the Living" (1728); "Letters, Moral and Entertaining, in Prose and Verse" (1729-'33); "Joseph, a Poem" (1736); and "Devout Exercises of the Heart," published after her death by Dr. Isaac Watts. Her "Miscellaneous Works, in Prose and Verse," were published in 1739 (2 vols. 8vo).

ROWE, Nicholas, an English dramatist, born at Little Barford, Bedfordshire, about 1673, died Dec. 6, 1718. He was educated at Westminster, and studied law. When 25 years old he composed a successful tragedy called "The Ambitious Stepmother." In 1702 appeared his tragedy of "Tamerlane." In 1703 he brought out "The Fair Penitent," founded upon "The Fatal Dowry" of Massinger, and in 1706 the comedy of "The Biter," which failed. Afterward he produced the tragedies "Ulysses," "The Royal Convert," "Jane Shore," and "Lady Jane Grey," and translated the *Pharsalia* of Lucan. In 1709 he published an edition of Shakespeare (7 vols. 8vo), with the first biography of the poet. In the reign of Queen Anne Rowe was under secretary of state for a short time. On the accession of George I. he was created laureate. He was buried in Westminster abbey.

ROWING, the art of propelling a boat by means of oars. In the Greek and Roman galleys the oars were arranged in banks, of which different galleys had from 2 to 12, and more. (See *GALLEY*.) In all civilized countries for a long period boating was merely a means of living to those who rowed people for pleasure, ferried them across rivers, or transported goods. It was not till the 18th century that boat racing became popular, especially on the Thames, the watermen testing their superiority in rowing in the clumsy boats then built. In 1715 Thomas Doggett,

the comedian, offered the prize still known as "Doggett's coat and badge" to the waterman's apprentice between Gravesend and Oxford who was the fastest sculler of the year, and this prize is still annually conferred. In England 50 years ago the racing boat was 35 ft. long and 6 ft. beam, weighed 700 lbs., and carried two oarsmen of 200 lbs. weight each, with two spare men to act as ballast and assist at the oars. Now four men weighing 150 to 160 lbs. each propel a shell of 17 in. beam and 41 ft. length, weighing but 94 lbs., over a six-mile course, at the rate of 9 m. an hour. The first notable improvement in racing boats was removing the oar from the rowlock on the gunwales to the outriggers. In a match race on the Tyne between the Fly of Scotswood and the Diamond of Ouseborn, Anthony Brown narrowed the Diamond, and by placing various pieces of wood on either side, now known as false outriggers, secured an easy triumph. Harry Clasper of Newcastle substituted for this rude device, not the light and graceful outrigger of to-day, with its rowlocks tightly blocked and wired, but something much nearer it than the original. It was not till 1844, when he won the £50 prize of the Thames national regatta in a four-oared outriggered gig of his own building, that the merits of the outrigger were generally acknowledged. He also remodelled the racing oar. Forty years ago it was an unwieldy stick "of prodigious size and loaded with lead at the loom end," while the blades were flat and straight, like those of the ash oars of to-day, and very wide. A London crew on the Tyne, with scoop or spoon oars, had beaten Clasper's crew, and Clasper did not rest until he had improved the spoon oar. "The progress and success of Tyne boating now became universal; crew after crew sprang up; boats underwent still further alterations; light men were substituted for the rollicking, over-fed, fourteen-stone keelmen; and the Clasper crew gained a notoriety which has long since been developed." The Thames Subscription club threw open yearly races, and the "Sons of the Thames crew," "Pride of the Tyne crew," and "Pride of the Thames crew" soon came to be familiar names. While the professional rowers were thus advancing, the amateurs were in no way behind. For some time prior to 1825 eight-oared rowing had been in vogue at Oxford, while the first eight-oared boat at Cambridge belonged to St. John's college, and was built in 1826 at Eton, which organized its boat club in 1825. On June 10, 1829, the chosen eights of Oxford and Cambridge first met on the course, 2½ m. long, from Hambledon lock to Henley bridge on the Thames, and Oxford won easily by 60 yards. The two universities next met in 1836, and rowed from Westminster bridge to Putney bridge, Cambridge now being the winner. They next met in 1839, and since then have nearly every year kept up the now famous rivalry. In 1874 Cambridge had won 15 times

and Oxford 16, but in 1875 the latter made her number 17. At Oxford there are 18 distinct college rowing clubs, and one university club. Yet one of the two large boat-building establishments of Oxford keeps 350 boats for hire, among which are 40 eight-oared outriggers and 40 four-oared outriggers, and in addition builds an average of three boats a week. At Cambridge there are 19 rowing clubs and one university club. In 1864, when the college crews were in training with a view to select from the best eight-oared crews the university crew with which to meet Oxford at Putney, a writer says that "the college eights were formed for practice in three divisions of 20 boats each, thus making 60 eight-oared outrigger cutters, or nearly 500 oarsmen in practice on the Cam at the same time, day by day." The Henley-on-Thames royal regatta, rowed late in June each year and open to all amateur clubs of a year's standing, has flourished since 1839; and among the competitors for its grand challenge cup and ladies' challenge plate for eights, its steward's, visitors', and Wyfold challenge cups for fours, silver wherries and goblets for pair-oars, and diamond skulls for scullers, it has for many years brought out the best amateur material in England. The record of matches in Great Britain for 1865, as far as known, footed up 365. There are also many clubs formed merely for exercise and pleasure, which do not race, making the total number of boating clubs in the United Kingdom more than 450.—In 1850 there was no boat club in the United States of more than a local reputation, and there had been no racing of importance. The boats of that day were half as wide and not much longer than the English wherry, though not so heavy. There was no distinctive class of watermen, and little rowing except in the harbors of the seaboard places, where only heavy boats could be used; and among the stevedores, longshoremen, and others plying these, racing was not popular. Apart from the credit due to a few professionals and to local amateur clubs, the most interesting if not most important racing records belong to the northern and eastern colleges. Rowing as a pastime began at Yale in 1843, and at Harvard in 1844. The first intercollegiate race took place on Aug. 3, 1852, at Centre Harbor, Lake Winnepiseogee. It was for eight-oared barges carrying coxswains, over a two-mile course. Harvard in the Oneida defeated the Halycon and Undine of Yale, leading at the finish by two lengths. The boats averaged about 37 ft. in length and 3 ft. in breadth. In 1855 Yale again challenged Harvard, and on July 21, on the Connecticut near Springfield, over a three-mile tideway course, the six-oared Nereid and Nautilus of Yale, each carrying a coxswain, were beaten by the Harvard four-oared Y. Y. with no coxswain, and the eight-oared Iris with a coxswain. The Iris took 23 m.; the Y. Y., after deducting an allowance of

11 s. an oar, 22 m. 3 s.; the Nereid, 23 m. 38 s.; and the Nautilus, 24 m. 38 s. In 1858 Harvard proposed to the undergraduates of the principal New England colleges and those of New York city to establish an annual intercollegiate regatta. Delegates from Harvard, Yale, Brown, and Trinity met at New Haven, May 26. The course was fixed at three miles. An allowance of 12 s. an oar was to be given to smaller boats, and the prizes were to be flags, not to exceed \$25 in value, and to be paid for by the entrance fees of the boats. But a week before the time appointed for the race the Yale boat was overturned by a collision, and her stroke drowned. This broke up the race. The next contest was at Lake Quinsigamond, near Worcester, Mass., July 26, 1859. All the boats were six-oared, Brown sending the lapstreak Atalanta, Yale the shell Yale, and Harvard the lapstreak Avon and the shell Harvard. The Yale and Brown boats carried coxswains. The boats were several feet longer than in former years, had narrowed to about 2 ft. in beam, and had been materially lightened. Harvard won easily in 19 m. 18 s., Yale being 60 s. later, and the others far behind. But next day, in a regatta thrown open by the citizens of Worcester, Harvard was beaten by Yale by 2 s. There was no rudder to the Harvard boat, while Yale had a coxswain; and the next year Harvard introduced a device which by dispensing with coxswains practically revolutionized American rowing. The bow oarsman, by touching with his foot a strip of wood or iron, moving horizontally on a pivot, worked wires running to a parallel strip on top of the rudder, and so steered the boat. This contrivance probably won Harvard the race in 1860 by 12½ s., while Yale carried a coxswain weighing 112 lbs. The war stopped these races till 1864, when Yale won, and again on July 28 and 29, 1865. Harvard took the flags for the following five years. The boats were still lengthening and narrowing, the climax being reached in 1866, when the Harvard craft was 57 ft. long and but 19 in. wide, while each rower, instead of sitting close up to the side of the boat furthest from his oar blade, sat in the middle, rendering her much steadier. In 1868 Harvard rowed the three miles on Lake Quinsigamond in 17 m. 48½ s. In 1869 Harvard challenged both the Oxford and Cambridge crews to a friendly race over their own course on the Thames, from Putney to Mortlake. Cambridge declined the challenge, but Oxford accepted, each crew to consist of four rowers and a coxswain. When the day, Aug. 27, came, Harvard was obliged to supply the places of two of her best oarsmen with comparatively new men. She was also overmatched by Oxford 44 lbs. in the total weight of crew. Yet in a course of 4 m. 3 fur. Harvard led for more than 2 m., Oxford finally winning by 1½ length in 22 m. 20.6 s. of time. In 1870, owing to some dissatisfaction with regard to the decision of the umpire, Yale

and Harvard resolved to row no more races on Lake Quinsigamond, and the 12th college regatta took place, July 21, 1871, on the Connecticut river, 6 m. above Springfield, when Harvard and Brown were beaten by the Amherst agricultural crew, which made the three-mile course in 16 m. 47 s. In 1872 the number of college crews increased to 6, in 1873 to 11; in 1874, when Columbia won in 16 m. 32½ s. on Saratoga lake, it fell back to 9, and in 1875 increased to 14. In the intercollegiate race on Saratoga lake, July 14, 1875, 12 colleges competed over a three-mile course, Cornell winning in 16 m. 53¼ s., Columbia coming in second in 17 m. 4¼ s., and only a half length in advance of Harvard. The college races have improved every year. Besides lengthening and narrowing the boats, improving the oars, and introducing foot rudders, the number of strokes per minute has been increased, with more uniformity and precision. The more powerful men are placed in the waist of the boat, the lighter ones at the ends, and for stroke oar a medium weight, tough, wiry man, who will maintain the required quickness through the race and force the heavy men behind to do the same. Instead of turning a stake boat, the races are now on a straight course from start to finish. This obviates the danger of collisions at the turning, and permits the introduction of more boats.—While the college races have been mainly instrumental in improving and making popular rowing in the United States, other amateur clubs and professionals have not been idle. For many years past, on July 4, Boston has held a rowing regatta, with prizes sufficient to encourage good local ability, bring out fast work, and stimulate rowing in New England generally. Occasionally crews from St. John, Portland, and Pittsburgh, and often the Wards, the Biglins, and Harvard men, have competed in these races. Fast single scullers sprang up from time to time, the names of R. F. Clark, M. Smith, John Tyler, jr., Fay, Appleton, and Walter Brown becoming well known, and these men materially reduced the time formerly needed to cover two miles. The Atlanta boat club of New York was organized in 1848, and in 1874 it was the oldest of 91 clubs in the state. Philadelphia has nearly a score of clubs, some of them 20 years old, while Pittsburgh has half as many; and of late years the interest has been spreading throughout the west and south, till Georgia has 12, Michigan and California each 20; and in 1874 there were 364 known rowing clubs in the United States, owning real and personal property to the aggregate value of more than \$500,000. It was not till 1859 that there was any formal contest between professionals for the championship at single sculling. Stephen Roberts, now (1875) a boat builder in New York, had for many years beaten nearly all contestants; but in a five-mile race off Staten island, Oct. 11, 1869, Joshua Ward of Cornwall on the Hudson won

the championship, beating three good men. On Aug. 14, 1862, James Hamill of Pittsburgh wrested it from him on the Schuylkill near Philadelphia, but in less than a year Ward won it back at Poughkeepsie; 13 months later, at the same place, it went again to Hamill; and less than a year afterward at Pittsburgh he once more defeated Ward. Walter Brown of Portland took it away from him at Pittsburgh, and lost it to him again at Newburgh a few months later, in a race for \$4,000. In 1866 Hamill went to the Tyne to contest with Harry Kelly, the English champion, and was twice badly beaten. Apart from these contests between single scullers, another class of professionals were competing. In 1860, at Lake Quinsigamond, "Josh" Ward with five others from the Hudson, though carrying a boy as coxswain weighing 40 lbs., rowed 3 m. in the Gersh Banker in 18 m. 37 s., the fastest time then on record. Many times during the next 12 years the Biglin brothers of New York proved their claim to the championship. Hamill at Pittsburgh, Stevens at Poughkeepsie, and Coulter at Pittsburgh, each succeeded in getting together a fair crew. But not till Josh Ward, with four of his brothers and J. L. Raymond, in July, 1868, at Worcester, beat the Harvard crew in 17 m. 40½ s., the fastest time ever made in America over a three-mile turning course, was the champion crew of America generally rated very fast. In 1867, at Springfield on the Connecticut, the Wards had easily beaten a picked crew from St. John, N. B., in a contest for \$1,000 and the American championship, course three miles to stake boat and return, the Wards winning in 39 m. 28 s. In October, 1868, St. John sent to the same course its "Paris crew," which in the exposition races of 1867 had beaten the picked crews of England and France, and now won \$3,000 and the championship, covering the six miles in 39 m. 28¾ s., the Wards coming in 60 s. behind. In 1870 the champion English four, with Renforth at stroke, met these St. John men at Lachine, Canada, and in a six-mile race beat them by half a minute. In 1871 the Tyne crew, including Renforth and Henry Kelly, again tried the St. John Paris crew on the Kennebecasis river, N. B., but hardly a mile and a quarter was rowed when Renforth, dropping his oar, fell backward into the boat, and shortly afterward died. Congestion of the lungs, caused by over exertion, was the coroner's verdict. A few days later, at Halifax, his crew, with John Bright as the new man, was beaten by the Biglins of New York, who were third, the other English crew being first and a Halifax boat second. But on Sept. 11, at Saratoga lake, came the greatest international race of all, the course being two miles to line of flag boats and return; the prizes were \$2,000, \$1,250, and \$750. The contestants were the Ward brothers, the Tyne crew, the Biglins, another Tyne crew, the Stevens four from Poughkeepsie, and a crew from

Pittsburgh. The Wards won, making time to the turn in 11 m. 20 s., and the four miles in 24 m. 40 s.—St. Petersburg, Paris, Vienna, Pesth, Marseilles, Antwerp, Amsterdam, Rotterdam, Hamburg, and many other European cities have their regularly organized rowing clubs. Indeed, as a popular amusement, rowing is now nearly universal.—In the matter of training, the course in later years has been uniformly one of improvement. Instead of unnatural sweating, physicking, and living on half-cooked meat and scarcely any vegetables or liquid, the preparation for the race is now much more rational. A generous supply of vegetables, a fair allowance of liquid, and abundance of fresh meats have been found to work so beneficially, notwithstanding the free perspiration which this diet occasions, that it is surprising that stinting is still so common. The first work is easy, and the approach to the severe is careful and gradual. A bath and a short walk (no running) before breakfast, short, slow pulls before dinner, in which great attention is paid to improving and perfecting the style, and a long, careful row in the afternoon, followed by a vigorous rub-down, soon begin both to toughen the men and bring uniformity in their rowing. Then the fast row over a part, and finally over the whole of the distance, takes the place of the long row, and for

the last two weeks before the race these fast rows are taken daily. There have been many variations from this régime.—To row as the term is now understood, one must sit facing opposite the way he wishes to go, and, bracing his feet against the footboard, and grasping his oar or oars firmly, must reach well out, promptly dip his blade in the water, and then vigorously throw the whole weight of his back and all the pushing power of his legs into the stroke, pulling until his hands actually touch his body. No one rows well who does not do substantially all these. The number of strokes per minute will vary in different crews from 39 to 45, and some crews have “spurred” to 47. Dr. J. E. Morgan, after a painstaking and exhaustive inquiry among all the Oxford and Cambridge oarsmen now living, and among the friends of those deceased, reaches a conclusion most favorable to this exercise, the only serious danger being to him who, with abounding pluck and spirit, has not yet sufficient growth or strength to take part in such a race at all.—The lightest forms of modern outrigger racing boats in the United States, built with a single streak or smooth skin, are called “shells.” Those for one oarsman are single shells, for two men each using a pair of sculls double sculls or shells, and for four and six men respectively, four- and six-oared shells.



FIG. 1.—Six-oared Rowing Shell: Elevation.

The covering of the wooden frame, technically known as the skin, is made of pine, cedar, or mahogany, of uniform thickness, from $\frac{1}{16}$ to $\frac{3}{16}$ in. according to the size of the shell; or the skin may be of layers or even a single sheet of the requisite thickness of manila paper,

stretched on a pine model, which is taken out when the paper skin is thoroughly dry. The skin is then made water-proof, is finished with hard varnishes, and must have a frame to support and keep it in shape. Other component parts of the shell are the washboards, decks

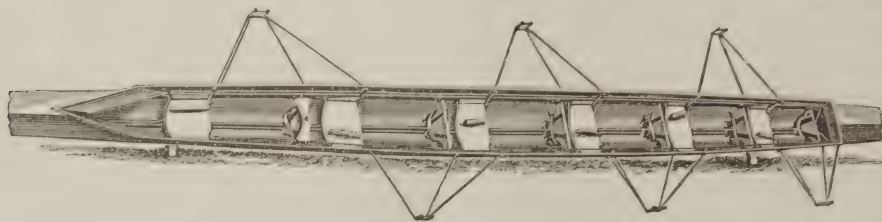


FIG. 2.—Six-oared Rowing Shell, showing Seats and Outriggers.

or “canvas” of thin wood, oiled linen, or silk, the thwarts or seats for oarsmen, stretchers or footboards against which the rowers press their feet, the rudder connecting with the “traveler,” which the bow oarsman operates with his feet, and the outrigger. The dimensions are: single shells, $9\frac{1}{2}$ to $15\frac{1}{2}$ in. beam, 28 to 31 ft. length; double shells, 14 to 30 in. beam, 32 to 34 ft. length; four-oared shells, $17\frac{1}{2}$ to 30 in. beam, 40 to 42 ft. length; six-oared shells, 19 to 21 in. beam, 48 or 49 ft. length. For the

lightest single sculls the draught is from 3 to $3\frac{1}{2}$ in., weight of boat 30 lbs., oars 6 lbs., rower 125 to 158 lbs.; total weight and displacement, 162 to 194 lbs. For larger single sculls the total weight may be 168 to 242 lbs., including boat 38 to 40 lbs., and rower 130 to 200 lbs. For double shells, draught $3\frac{1}{2}$ to $4\frac{1}{2}$ in., boat 50 to 90 lbs., oars 12 to 14 lbs., crew 262 to 458 lbs.; total weight, 324 to 562 lbs. For four-oared shell, draught $4\frac{1}{2}$ to $5\frac{1}{2}$ in., boat 94 to 180 lbs., oars 26 to 28 lbs., crew 552 to 800 lbs.;

total weight and displacement, 672 to 959 lbs. For six-oared shells, draught 5 to 5½ in., boat 120 to 150 lbs., oars 36 lbs., crew 760 to 880 lbs.; total weight and displacement, 916 to 1,098 lbs. These displacements are in fresh water; in salt water they are reckoned a few pounds more. Eight-oared shells are not yet common in the United States. The cost of the boats, without oars, is: for single shells, \$90 to \$100; double, \$135 to \$190; four-oared, \$210 to \$260; six-oared, \$300.—Among the many works on the construction of boats, records of races, training, and modern method of rowing, the following are prominent: "The Principles of Rowing, by an Oarsman" (London, 1846); "Manual of British Rural Sports, by Stonehenge" (London, 1863); "Modern System of Naval Architecture," by John Scott Russell (3 vols., London, 1865); "Book of American Pastimes," by Charles A. Peverelly (New York, 1866); "Training in Theory and Practice," by Archibald Maclaren (London, 1866); "The Arts of Rowing and Training, by Argonaut" (London, 1866); "The Boat, and How to Manage it, by Salacia" (London, 1868); "How to Row," by T. J. Derington (Oxford, 1870); "The Oxford and Cambridge Boat Races," by W. F. Macmichael (Cambridge, 1870); "Yale and Harvard Boat Racing" (New Haven, 1871); "Four Years at Yale, by a Graduate of 1869" (New Haven, 1871); "The Illustrated Oarsman's Manual" (Troy, N. Y., 1872); "University Oars: A Critical Inquiry into After-health," by Dr. J. E. Morgan (London, 1873); and the "Rowing Almanac and Oarsman's Companion" (London, annually since 1861).

ROWLEY, William, an English dramatist of the age of Elizabeth, who lived through the reign of James I., and died in that of Charles I. He was educated at Cambridge, belonged to the royal company of players, excelled in comedy, and was intimate with all the poets and wits of his time, many of whom he assisted in the preparation of plays, and some of whom assisted him. Thus, "A Fair Quarrel" is by T. Middleton and W. Rowley; "The Witch of Edmonton" is by Rowley, Decker, and Ford; "The Old Law" is by Massinger, Middleton, and Rowley; "Fortune by Land and Sea" is by Heywood and Rowley; and it is said that in "The Birth of Merlin" Rowley received some assistance from Shakespeare. The Percy society in 1840 republished his tract, "A Search for Money, or the Lamentable Complaint for the Losse of the Wandring Knight, Monsieur l'Argent."

ROXBURGHSHIRE, a S. E. county of Scotland, bordering on Cumberland and Northumberland, England; area, 670 sq. m.; pop. in 1871, 53,965. Jedburgh, Kelso, Hawick, and Melrose are the chief towns. The principal rivers are the Tweed and Teviot. The Cheviot hills extend from the E. to the S. W. extremity of the county, and afford excellent pasturage. Many sheep are raised. Wool is manufac-

tured. Roxburghshire is very rich in remains of monastic magnificence. Scott has made many of its traditions familiar to the world.

ROXBURY, formerly a city of Norfolk co., Massachusetts, but since 1867 forming the 13th, 14th, and 15th wards of Boston; pop. in 1860, 25,137; in 1870, 34,772. It is connected with Boston proper by Boston neck. It was settled in 1630, and incorporated as a city in 1846. Roxbury was for many years the scene of the labors of John Eliot, the apostle to the Indians, whose remains are in the "ministers' tomb" in the old burial ground.

ROXOLANI. See *SARMATIA*.

ROY, William, a British surveyor, born near Lanark, Scotland, May 4, 1726, died in London, July 1, 1790. From 1746 to 1755, being a colonel in the army, he was employed in mapping the Scottish highlands for the establishment of military posts. He became a general, and between 1783 and 1788 made a trigonometrical survey from Greenwich to Dover (the first in Great Britain), to aid in determining the difference of latitude and longitude between the Greenwich and Paris observatories. At his death he was surveyor general of the coast. The society of antiquaries published his work on "The Military Antiquities of the Romans in North Britain" (fol., with 51 plates and 3 maps, 1793).

ROYAL FERN. See *OSMUNDA*.

ROYER-COLLARD, Pierre Paul, a French statesman and philosopher, born at Sompuis, Champagne, June 21, 1763, died at Châteauneuf, Loir-et-Cher, Sept. 4, 1845. He was an advocate, held office in Paris after the commencement of the revolution, and after Aug. 10, 1792, was proscribed as a moderate. In 1797 he was elected to the council of 500 by the department of Marne, which he afterward represented in the chamber of deputies under the restoration and Louis Philippe. He was a liberal royalist, and the founder of the party of *doctrinaires*. The most eloquent of his discourses was delivered in 1825 against the proposed law of sacrilege, which would have required of every citizen a profession of the Roman Catholic faith. From 1811 till March, 1814, he was professor of the history of philosophy in the Sorbonne. In 1827 he succeeded Laplace as a member of the French academy. The master of Cousin and Jouffroy in speculative philosophy, and of Guizot and De Tocqueville in political science, he has left no permanent record of himself at all corresponding to his personal reputation and authority. His philosophical writings, chiefly fragmentary, are published with Jouffroy's translation of the works of Reid.—See *Vie politique de M. Royer-Collard, ses discours et ses écrits*, by Barante (2 vols., Paris, 1861), and *Vie de Royer-Collard*, by M. de Lacombe (1863).

RUBEN, Christoph, a German painter, born in Treves in 1805, died July 8, 1875. He studied at Düsseldorf and Munich, was connected with the academy of Prague, and in 1852 be-

came director of that of Vienna. He executed many cartoons for churches and for the palace of Hohenschwangau. His most celebrated oil painting is "Columbus at the Moment of Discovering Land," now in Prague.

RUBENS, Peter Paul, a Flemish painter, born at Siegen, Germany, June 29, 1577, died in Antwerp, May 30, 1640. His father, John Rubens, was the secretary of William the Silent, who on discovering his intimacy with his wife imprisoned him in a citadel, and next banished him to Siegen, whence he was permitted to remove in 1578 to Cologne, where he died in 1587. In 1588 Rubens went with his mother (Maria Pypelinckx) to Antwerp, where he became page of Marguerite de Ligne, countess de Lalaing, but soon left her to study art, chiefly under A. van Noort and O. van Veen or Venius, by whose advice he went in 1600 to Italy, furnished with letters of recommendation from the archduke Albert, then viceroy of the Netherlands, and his consort, the infanta Isabella. He was generally accomplished, handsome, and dignified. Making Venice his first halting place, "he compounded," says Fuseli, "from the splendor of Paul Veronese and the glow of Tintoretto that florid system of mannered magnificence which is the element of his art and the principle of his school." Vincenzo di Gonzaga, the duke of Mantua, attached him to his court, sent him on a diplomatic mission to Spain, and enabled him to reside in Rome. Subsequently he visited Milan and Genoa, where he made a collection of drawings of the chief edifices (published in 2 vols. fol. in 1622). The serious illness of his mother in 1608 hurried him back to Antwerp, and there he was appointed court painter by the archduke. In 1609 he married Isabella Brandt, a sister-in-law of his brother Philip, and for many years was prosperously engaged in his profession. His pictures painted at this period are considered, both in composition and finish, his most pleasing productions; and notwithstanding the rapidly increasing demand for them, it is probable that the greater part were executed wholly by himself. In his later works he was aided by pupils. He lived in an elegant mansion built by himself and stored with works of art, and his prestige as courtier and artist drew around him pupils from all parts of Europe. In 1620 he was commissioned by Maria de' Medici to decorate the gallery of the Luxembourg palace with allegorical compositions illustrating the principal events in her career. The pictures, 21 in number, were in great part executed by his most eminent pupils from sketches prepared by him, which are now in the Pinakothek in Munich. While in Paris, superintending the details of this commission, Rubens made the acquaintance of the duke of Buckingham, who bought his entire collection of works of art for 100,000 florins. In 1626 he was for a time rendered inconsolable by the death of his wife, whose portrait he frequently introduced into his works.

In the following year he was sent by the infanta Isabella to the Hague to negotiate with Sir Balthasar Gerbier, the agent of Charles I. of England; and in the autumn of 1628 he revisited Spain. Philip IV. appointed him secretary to the privy council, an office subsequently granted in reversion to his eldest son, Albert. Scarcely had he returned to Flanders in the spring of 1629, when he was sent as envoy to England. During his residence there, which terminated in February, 1630, he painted his allegory of "Peace and War," now in the British national gallery, with other works, and was knighted. Returning to Antwerp, he married in December, 1630, Helena Forman or Fourment, a girl of 16. So numerous at this time were his commissions from crowned heads alone, that he had time for little more than designing and applying the finishing touches to the pictures which pass under his name, leaving the body of the work to be done by assistants. In this manner were executed the series of pictures representing the apotheosis of James I. for the ceiling of the banqueting house of Whitehall, which he completed in 1635, receiving for them £3,000. In 1633 he was sent on another embassy to Holland, which was interrupted by the death of the infanta. This was his last public service, and a few years later he became in a great measure incapacitated for work by the gout, which finally caused his death. His posthumous collection of works of art, including 319 pictures, is said to have produced £25,000. The pictures ascribed in whole or in part to Rubens amount, according to Smith's *catalogue raisonné*, to 1,800, or, estimating the number of years he was actually engaged in the practice of his art, to nearly one a week. They comprise history, portraits, landscapes, animals, and fruit and flower pieces, and are widely dispersed over Europe, the collection in the Louvre being particularly rich. The finest are still in Antwerp, in the cathedral of which city are his well known "Descent from the Cross" and "Elevation of the Cross," the former being generally considered his masterpiece. In the academy at Antwerp are many of the pictures executed by Rubens in his earliest and best period, but some of those formerly in the churches have been removed to other collections. The Belvedere in Vienna contains a noble altarpiece, with wings, representing the "Virgin presenting a splendid Robe to St. Ildefonso;" "St. Ambrose refusing to admit the Emperor Theodosius into the Church;" and two altarpieces representing the miracles performed by St. Ignatius Loyola and St. Francis Xavier. In the Pinakothek at Munich, which contains nearly 100 of his works, are two which especially illustrate the surprising energy which he infused into his delineations of human actions, the "Battle of the Amazons" and the small picture of the "Fall of the Damned." Scarcely less powerful, though in a different degree, is the

"Village Fête" in the Louvre. The British national gallery possesses the "Rape of the Sabines," which has been called "a perfect nosegay of color," the "Judgment of Paris," and several other works. Animal vigor, in the representation of which Rubens excelled, is seen nowhere with more effect than in his bacchanal feasts and mythological subjects of the coarser kind, of which "Castor and Pollux carrying off the Daughters of Leucippus," wonderful for its flesh coloring, and "Sleeping Wood Nymphs surprised by Satyrs," in the Pinakothek, are excellent examples. In his representations of the human figure he seldom attempted to idealize, and his Madonnas, Magdalens, and female saints are literally imitated from Flemish types of womanhood. As an animal painter he showed great excellence, and Sir Joshua Reynolds particularly commends his lions and horses, which, he observes, "perhaps never were properly represented but by him." His portraits are by some considered superior in their combinations of vigorous life with careful handling to any other of his productions, especially his "Straw Hat," and his numerous portraits of himself and his wives; while in his landscapes he exhibited, says Kugler, "the same juiciness and freshness, the same full luxuriant life, the same vigor and enthusiasm as in his historical pictures."—Among the numerous biographers of Rubens are Waagen, in Raumer's *Historisches Taschenbuch* (Leipsic, 1833; English translation by R. R. Noel, edited by Mrs. Jameson, London, 1840); A. van Hasselt (1840); A. Michiels, *Rubens et l'école d'Anvers* (Paris, 1854); Gustave Planche (1854); and Sainsbury (London, 1859). See also Waagen's "Treasures of Art in Great Britain" (4 vols., London, 1854-'7).—His son ALBERT RUBENS (1614-'57) published several archæological works.

RUBICON, or *Rubico*, a small river of Italy, flowing into the Adriatic a little N. of Rimini (Ariminum), celebrated for its passage by Cæsar in his march toward Rome, 49 B. C. This act was equivalent to a declaration of war against the republic, as the Rubicon was the dividing line between Italy and his province of Cisalpine Gaul. On reaching its brink he is said to have hesitated a moment and then plunged in, exclaiming: *Jacta est alea* ("The die is cast"). In 1756 a papal bull declared the Lusa, the larger and more southern of two neighboring streams, to be the Rubicon; but modern geographers generally prefer the Fiumicino, formed by the Pisatello and Rugone.

RUBIDIUM (Lat. *rubidus*, dark red), a metal of the alkalis, discovered by Bunsen and Kirchhoff in 1860 by means of the spectroscope. The lines characteristic of the new metal are two remarkable bands of dark red lying beyond Fraunhofer's A, and consequently in a part of the spectrum visible only by unusual methods. Two blue and some yellow and green lines on the spectrum have since been observed. Rubidium occurs in a

considerable variety of potash minerals, among which may be mentioned the deposits of the Stassfurt salt mines; lepidolite from Rozna in Moravia, and from Goshen and Paris, Me.; orthoclase, triphylline, carnallite, and saltpetre; in mineral waters; in beet root, tobacco, ashes of tea and coffee, crude tartar, ashes of oak and of a great variety of plants, being very widely though sparingly distributed. The metal was extracted by Bunsen from the acid tartrate, 1,100 grains of which when distilled furnished about 80 grains of a brilliant metallic mass. It is silver white, with a slightly yellow lustre, oxidizes rapidly in the air, and takes fire spontaneously. It is soft like wax at 14° F., melts at 101°, and at red heat furnishes a blue vapor. It is more electro-positive than potassium, and when thrown upon water takes fire and burns with a violet flame resembling that of potassium. It burns readily in chlorine, bromine, iodine, sulphur, and arsenic vapors. Its symbol is Rb; specific gravity, 1.52; atomic weight given by Bunsen at 85.36, by Piccard at 85.41. The salts of rubidium are with difficulty distinguished from those of potassium, and the only certain test is the appearance of the flame in the spectroscope. The sparing solubility of the chloride of rubidium and platinum in boiling water is employed as one of the means of obtaining pure salts of rubidium.

RUBINI, Giovanni Battista, an Italian singer, born at Romano, near Bergamo, in 1795, died there, March 2, 1854. In his boyhood his teacher reported that he had no talent for singing; but he persevered in his studies, and after an obscure career of several years in Lombardy made his début at Brescia in 1815 with great success. He first appeared at Paris in 1825 as Ramiro in Rossini's *Cenerentola*, and speedily rose to the first place in his profession as a tenor singer. From 1831 to 1846 he sang principally in London, Paris, and St. Petersburg, and in the latter year retired with a large fortune to a villa near Bergamo, where he passed the remainder of his life. His voice, a tenor of remarkable sweetness, extended from E to F above the staff, a compass of two octaves and one note, and has been known to reach as high as G above the staff. He excelled in the music of Bellini, and was almost unrivalled in the expression of sorrow and tenderness. He was an indifferent actor.

RUBINSTEIN, Anton, a Russian musician, born in a frontier village of Bessarabia, Nov. 30, 1830. He is of Jewish descent, but was brought up by his father in the Greek faith. His mother was an excellent pianist, and instructed him and his brother Nicholas, since director of the conservatory at Moscow, in the elements of music. The family removed to Moscow while he was still a child, and there at the age of six he began the systematic study of music. At the age of nine he gave his first public concert in that city. The result was so encouraging that he was sent in

August, 1840, with his teacher Villoing, to Paris, where Liszt heard him and prophesied for him a great career. Here he studied diligently for a year and a half, and then undertook his first artistic tour in England, Holland, Sweden, Denmark, and Germany. After the close of this prosperous tour Rubinstein remained at home in Russia for a year, and then by the advice of Meyerbeer was placed under the instruction of the famous contrapuntist Dehn at Berlin. In 1846, left to his own resources, he went to Vienna, giving there for a year lessons upon the piano, at the close of which time he undertook a concert tour in Hungary with the flutist Heindl, and then went to Berlin, but on the breaking out of the revolutionary troubles of 1848 retired to St. Petersburg. In 1849 he wrote his first opera, *Dmitri Donski*, which was brought out in 1852. The grand duchess Helen now patronized the young composer, and at her instigation he wrote three one-act operas, "The Circassian," "The Siberian Hunters," and "Tom the Fool." Rubinstein founded and for nine years superintended the conservatory at St. Petersburg, and between 1850 and 1860 composed more than 50 works in various forms, many of them of the largest dimensions. Among these were his "Ocean Symphony" and three other symphonies, six string quartets, his trios in G minor and B flat major, his oratorio "Paradise Lost," and a great variety of pianoforte compositions, including his two concertos in F and G for piano and orchestra, and many songs. He found time also to give concerts in Germany, Paris, and London, everywhere exciting the liveliest interest by his astonishing qualities as a pianist. In February, 1861, his German opera *Die Kinder der Haide* ("The Children of the Steppe") was produced under his supervision at Vienna. Later he composed another German opera entitled *Feramors*. He made his first appearance in America at New York on Sept. 23, 1872. During the succeeding winter and spring he gave concerts in all the larger cities of the United States as far west as the Mississippi, meeting everywhere with the same success that attended his concert tours in Europe. Returning to Russia in 1873, he devoted himself anew to composition, producing on Jan. 25, 1875, at St. Petersburg, his fantastic opera "The Demon," founded on a legend by Lermontoff, and at Berlin, in April of the same year, another opera, *Die Moccabäer*. Since Liszt ceased to play in public, Rubinstein has had no superior as a pianist.

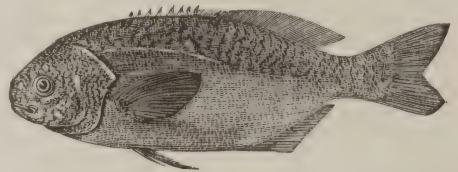
RUBLE, a Russian silver coin and unit of account. About the beginning of the 14th century the Russians began to use silver in bars for purposes of trade. The act of cutting off from a bar sufficient weight for a payment was called *rubit*, whence the name ruble. The ruble is divided in account into 100 copecks. The value has greatly varied at different times. By the circular of the secretary of the trea-

sury of the United States dated Jan 1, 1875, the rating of foreign silver coins has been considerably reduced owing to the depreciation of the value of silver as compared with gold. In the article *Corns* the value of the silver ruble in 1872 is given at 79.4 cents; by the above named circular it is now fixed at 73.4 cents. Gold is coined in pieces of five rubles; fractions of the ruble are in silver. For the paper ruble see *ASSIGNATIONS*.

RUBY. See *SAPPHIRE*.

RÜCKERT, Friedrich, a German poet, born in Schweinfurt, May 16, 1788, died near Coburg, Jan. 31, 1866. He completed his studies at Jena, was a journalist at Stuttgart from 1815 to 1817, and was professor of oriental languages for 15 years at Erlangen, and for 8 years at Berlin. His works embrace various collections of lyrical, epic, and other poems; *Die Weisheit der Brahmanen*, a didactic poem (6 vols., 1836-'9; 7th ed., 1870); and admirable translations from the Arabic and other oriental tongues, including *Die Verwandlungen des Abu Seid von Sarug, oder die Makamen des Hariri* (2 vols., 1826; 5th ed., 1875). Among his posthumous works is one on the Coptic language (1875). His life has been written by Fortlage (1867) and Beyer (1868).—His son **HEINRICH**, an eminent historian, born in Coburg, Jan. 14, 1823, died in Breslau, Sept. 11, 1875.

RUDDER FISH, one of the mackerel family, constituting the only described species of the genus *pallinurus* (De Kay). It belongs to the division of the scomberoids in which the first dorsal is composed of isolated spines connected by a low membrane; the gill covers are serrated and spiny; there are one or more spines in front of the anal fin, which seems to remove it from the scomberoids with which in other respects it agrees; the body is elevated, compressed, and oblong, and the tail without lateral keel; the profile is vertical; the teeth are small, pointed, and nearly equal. The *P. perciformis* (De Kay), the black pilot, or the rud-



Rudder Fish (*Pallinurus perciformis*).

der fish of the fishermen of Martha's Vineyard, attains a length of from 9 to 12 in.; it is occasionally seen on the coasts of Massachusetts and New York. The color is bluish white on the sides, with minute black dots, the lower parts lighter; top of head and back with black blotches; in the young the color is a bright bronzed black, with obscure reddish hues; there are eight short spines in front of the fleshy rays of the dorsal; a bony ridge is observed over the eyes, and there is a depression between them.

RUDOLPH I. of Hapsburg, emperor of Germany, founder of the imperial house of Austria, son of Count Albert IV. of Hapsburg, born in the Breisgau, May 1, 1218, died in Gernersheim, July 15, 1291. He was brought up at the court of his uncle the emperor Frederick II., under whom he served in the wars in Italy. On the death of his father in 1240, he succeeded to the landgraviate of Upper Alsace, the burgraviate of Rheinfelden, and with his brother to the county of Hapsburg. He wrested additional territory from his relatives and others, and in 1245 married a daughter of Burchard, count of Hohenberg, who brought him valuable possessions. He distinguished himself in several wars, and acquired so high a reputation for justice and prowess that he was chosen by many cities as their protector and the leader of their armies. In 1264 he became chief magistrate of Zürich, and was involved in several conflicts, which generally terminated in his favor. The most bitter of these was with the bishop of Basel, and Rudolph was besieging that city in 1273 when he was unanimously chosen to the throne of Germany in preference to Alfonso of Castile and Ottocar of Bohemia. Basel immediately opened its gates, in spite of the angry remonstrances of the bishop. Rudolph strengthened himself after his coronation at Aix-la-Chapelle (Oct. 28) by the marriage of his two daughters, Matilda and Agnes, to Louis, duke of Bavaria, and Albert, duke of Saxony, and by a concordat with Pope Gregory X., who persuaded Alfonso of Castile to recognize Rudolph, while Duke Henry of Bavaria and King Ottocar of Bohemia were speedily overcome by him. Ottocar, after violating a truce, fell in battle on the Marchfeld, Aug. 26, 1278. Rudolph restored Bohemia and Moravia to Wenceslas, son of Ottocar, but retained Austria, Styria, and Carniola for his own sons. He now established order and tranquillity in his dominions, put an end to the depredations of the feudal barons by sentencing many of them to death and demolishing their strongholds, and passed so many new decrees that he was called *lex animata*, "the living law." Under him German was substituted for Latin in official documents. Rudolph also engaged in a successful war with the count of Savoy, but was unsuccessful in 1288 against the city of Bern. He restored order in Bohemia, delivering the young king Wenceslas II. from his captivity, and marrying him to one of his daughters. He was greatly mortified at the refusal of the diet of Frankfort in 1291 to choose his son Albert as his successor. He set out for Spire, but died on the way, and was succeeded on the imperial throne by Adolphus of Nassau.—See *Geschichte Rudolfs von Habsburg*, by Schönhuth (2 vols., Leipsic, 1843-'4).

RUDOLPH II., emperor of Germany, born in Vienna, July 18, 1552, died Jan. 20, 1612. He was the son of Maximilian II. and Maria, daughter of Charles V., a bigoted princess, un-

der whose charge he passed his early years. In 1564 he was sent to the court of Spain, where Philip II., who had then no male issue, designed him to be his successor, and here the Jesuits continued his education. In 1572 he was crowned king of Hungary and in 1575 of Bohemia, was in the latter year elected and crowned king of the Romans, and on Oct. 12, 1576, succeeded Maximilian in all his dominions. Under the tolerant rule of his father the Protestants had gained vastly in strength, especially in the Austrian states. Rudolph, led by the Spanish court and the Jesuits, proceeded at once to restore the Catholic party to its former position. The religious dissensions broke out in all their former bitterness, and Aix-la-Chapelle, the electorate of Cologne (where the dispute arose out of the ecclesiastical reservation), and the see of Strasburg became the theatre of war. Failing to obtain redress from Rudolph, a number of the Protestant states formed in 1608 a confederacy known as "the Union," and in the following year the Catholic states established a counter confederacy styled "the League." While Germany was thus brought to the brink of a general struggle, the incapacity and intolerance of Rudolph, who had been involved in war with the Turks and Transylvania, had alienated his family, and provoked an insurrection in Hungary under Bocskay (1604) which threatened to overturn his throne. In 1608 he was forced to cede Hungary, Austria, and Moravia to his brother Matthias, who had gained the malcontents by promises of religious liberty (see MATTHIAS); and in July, 1609, the Protestants of Bohemia extorted from the distressed emperor a letter patent (*Majestätsbrief*) guaranteeing the exercise of their religion. A new war was kindled in Germany by the disputed succession to the dominions of the duke of Jülich. In 1611 an attempt against the liberties of Bohemia, whose capital Prague was his favorite residence, cost Rudolph the crown of that kingdom, which was transferred to Matthias. Rudolph died soon after, stripped of all but his imperial dignities. His temper had become extremely gloomy and mistrustful, and from superstitious fear he had never married and sought to keep his brothers from doing so. He was fond of science and the mechanical arts, in which last he personally excelled, but he was greatly addicted to alchemy as well as to astrology, which at his court found votaries in Tycho Brahe and Kepler. He encouraged letters, his reign being the most brilliant period of Bohemian literature. He was succeeded by Matthias.

RUDOLSTADT. See SCHWARZBURG-RUDOLSTADT.

RUE, from *ruta*, the ancient Latin and present botanical name of a genus of plants, one species of which, the common rue (*R. graveolens*), has long been cultivated, and is now occasionally seen in old gardens. The genus *ruta* comprises about 40 species, which are natives of the Mediterranean region and west-

ern Asia; it gives its name to the *rutaceæ*, a family of polypetalous exogens which, under the recent revision of Hooker and Bentham, is a large and important one, as they have included in it the orange family and others of less importance, and it now consists of over



Garden Rue (*Ruta graveolens*).

80 genera, numbering some 650 species. The only representatives of this family indigenous to the northern states are prickly ash and hop tree, which are described under their titles. The common rue, from the south of Europe, is hardy in the northern states; it is a half shrubby plant, with alternate, pinnately divided leaves, which are of a bluish green and strongly marked with transparent dots or glands containing an oil of a powerful and unpleasant odor; the greenish yellow flowers are produced all summer in small corymbs, the first flower which opens in each cluster having its parts in fives, and all the others in fours; stamens twice as many as the petals, inserted at the base of a glandular disk which surrounds and elevates the compound pistil; fruit a four- or five-lobed, many-seeded pod. Rue was formerly held in high repute, and was thought by the ancients to prevent contagion; it is still somewhat employed in domestic medicine, though it is too dangerous to be carelessly administered; its properties are due to the oil contained in the leaves, which is so acrid that persons with delicate skin are blistered by handling it, and children in playing with it have suffered from its effects. Rue is at present comparatively little used. It is called antispasmodic, and has been used in hysteria as well as in colic and in dysmenorrhœa. It has also been employed to procure abortion, acting like most drugs of this class with great and even dangerous violence. The fresh plant is eaten in some parts of Europe as a condiment and in salads, it being thought to strengthen the sight. The "vinegar of the four thieves," used by robbers in France to

enable them to carry on their thieving during the plague, contained rue. Like rosemary, rue was formerly employed in religious ceremonies, for which reason Shakespeare speaks of it in two of his plays as "herb of grace." —Meadow rue is a name for several species of *thalictrum*, of the ranunculus family, which have none of the properties of common rue.

RUFF, a wading bird of the subfamily *tringinæ* or sandpipers, and the genus *philomachus* (Möhr.). The bill is as long as the head, straight, rather slender, with sides compressed and grooved, and slightly dilated at tip; wings long and pointed, the first and second quills longest and equal; tail moderate and nearly even; tarsi long and slender, covered in front with transverse scales; toes moderate, the lateral ones unequal, with the outer united to the middle as far as the first joint, and the hind one elevated and short. The ruff (*P. pugnax*, Gray) is about 10 in. long, and the bill $1\frac{1}{4}$ in.; above it is varied with black, rufous, and gray, arranged in oblique bands on the scapulars and tertiaries, and whitish below; primaries dark brown, with green reflections above and with inner webs finely mottled toward the base; the tail, except the three outer feathers, transversely barred; sides of rump white, bill brown, and legs yellow. The males in spring have the feathers of the neck developed into a kind of ruff, whence the common name, and the face is covered with reddish papillæ; they fight during the breeding season, unlike most wading birds; they are also polygamous, and larger than the females, and in these three respects the ruff seems to form one of the links between wading and gallinaceous birds; the females are called reeves. The colors of the ruff vary exceedingly, and



Ruff (*Philomachus pugnax*).

no two are precisely similar. They are natives of northern Europe and Asia, migrating southward during winter; they have been introduced into America, and are sometimes killed on Long Island. They are found chiefly in flocks, in marshy and moist districts; they

feed at night on worms, insects, and larvæ; the nest is made of coarse grass, and is placed in a hollow of the ground; the eggs are four or five, pointed, green with brown specks. Their flesh is esteemed; they are taken alive in nets and fattened for market; great numbers are sent from Holland to London.

RUFFED GROUSE, or **Partridge**. See **GROUSE**.

RUFFINI, **Giovanni**, an Italian novelist, born in Genoa about 1810. He and his brother Jacopo were fellow students of Mazzini at Genoa, and Giovanni coöperated with the latter in organizing at Marseilles the league known as *la giovine Italia*. In 1834, on the failure of the invasion of Savoy planned by Mazzini, Jacopo was executed, while Giovanni escaped, and lived chiefly in England till the amnesty of 1848, when for a short time he was Sardinian minister in Paris. In 1849 he returned to England, where he has since resided. He is married to an English lady, and writes English with remarkable fluency and elegance. He has published "Lorenzo Benoni, or Passages in the Life of an Italian," an autobiographical narrative (London, 1853); "The Paragreens' Visit to the Paris Exhibition" (1855); "Doctor Antonio" (1855); and "Lavinia" (1860).

RUFINUS. See **STILICHO**.

RUGBY, a market town of Warwickshire, England, on the river Avon, 16 m. N. E. of Warwick, and 83 m. N. W. of London; pop. in 1871, 8,385. It is on the line of the London and Northwestern railway, and several other railways meet here. It has important horse, cattle, wool, and cheese fairs. The grammar school, of which Dr. Thomas Arnold was head master from 1828 to 1842, was founded in 1567 by Lawrence Sheriff, a London tradesman born in Rugby. It occupies a quadrangle of buildings in the Elizabethan style, and has 14 teachers and about 500 students, with an income from its endowment of about £5,000, and 20 exhibitions to the universities of £40 to £80 per annum for four years.

RUGE, **Arnold**, a German author, born at Bergen, island of Rügen, Sept. 13, 1803. He was imprisoned for five years as a member of a political students' association, but subsequently graduated and lectured on philosophy at Halle, and joined in the publication of the *Hallische Jahrbücher*, which was ultimately suppressed in Prussia and Saxony. He next edited for about two years the *Deutsch-französische Jahrbücher* in Paris, conjointly with Karl Marx, and afterward connected himself with Julius Froebel's literary bureau at Zürich, which was closed by the authorities, as was also a similar establishment which he founded in 1847 at Leipzig. The city of Breslau elected him in 1848 to the Frankfort parliament. In the same year he established *Die Reform*, a daily journal, at Berlin, which was speedily suppressed, and he was expelled from that city, and in 1849 also from Paris. With Ledru-Rollin and Mazzini he founded in London in the same year the European democratic committee, and he

has since resided at Brighton as a visiting tutor. His collected works (10 vols., Mannheim, 1846-'8) were followed by his *Revolutionsnovellen* (2 vols., Leipsic, 1850) and *Aus früherer Zeit* (4 vols., Berlin, 1862-'7). He has translated into German "The Letters of Junius," Buckle's "History of Civilization" (5th ed., 1874), Henry Lytton Bulwer's "Life of Viscount Palmerston," and other works.

RÜGEN, an island of Prussia, in the province of Pomerania, separated from the mainland by a channel from $\frac{1}{2}$ to 2 m. wide; area, about 400 sq. m.; pop. of the circle of Rügen in 1867, 47,539. Numerous shallow bays and arms of the sea divide it into several peninsulas. The channel separating it from the mainland is gradually narrowing. (See **BALTIC SEA**.) The surface presents great variety, and the scenery is very beautiful. The island is much visited in summer for sea bathing. The Stubbenkammer, a chalk headland in the north, rises about 440 ft. above the sea, its highest point, called the King's Seat, being the summit from which Charles XII. witnessed the sea fight between the Swedes and Danes, Aug. 8, 1715. There are many ancient sepulchral mounds on the island. Capital, Bergen. —Rügen was occupied in the 6th century by the Rugians, a Germanic people, and subsequently by Slavs, and in the early part of the middle ages was governed by princes of its own, but the Danes conquered it in 1168. The Swedes occupied it during the thirty years' war, and it was ceded to them at the peace of Westphalia, but it was allotted to Prussia in 1815. Several engagements took place off the island in 1864 between the Danes and the Prussians.

RUM, a spirituous liquor distilled from fermented molasses, the refuse juice and scum from the sugar manufacture, and the spirit wash or lees (known as *dunder*) of former distillations. A peculiar volatile oil comes over in the first part of the process, which imparts to the rum its flavor. The manufacture of rum has long been carried on extensively in connection with that of sugar and molasses upon the plantations of the West India islands. Jamaica rum ranks first in quality, and that made in Santa Cruz is also favorably known. In the New England states it has been largely distilled from molasses. In Newport, R. I., there were in the last century 80 of these manufactories, and their product was a staple article in the African slave trade. The materials named above are employed in various proportions at different places. In some the proportion of spent wash already used several times over is so great as to seriously impair the flavor. The fermentation is continued upon large quantities of material at a time from 9 to 15 days, according to the strength of the wash and condition of the weather. Rum often has a deep red color, which is acquired from molasses or caramel added for the purpose, and not from the wood of the casks as is commonly supposed. Unlike other spirits, rum

tends to cause perspiration. Rum is greatly improved by age, and when very old is often highly prized. At a sale in Carlisle, England, in 1865, rum known to be 140 years old sold for three guineas a bottle.

RUMELIA. See **ROUMELIA**.

RUMFORD, Benjamin Thompson, count, an American natural philosopher, born in Woburn, Mass., March 26, 1753, died at Auteuil, near Paris, Aug. 21, 1814. He was educated at the common school in his native place, afterward at Medford, and at the age of 13 entered the counting house of a Salem merchant. In 1770 he taught an academy in Rumford (now Concord), N. H., and in 1772 married Mrs. Rolfe of that place, a wealthy widow considerably his senior, and was made major in the militia of New Hampshire by the royal governor. This excited the jealousy of older officers, and he was charged with disaffection to the cause of the colonies, driven from his home, and finally took refuge in Boston, where he became an associate of Gen. Gage and the other British officers. He was subsequently tried at Woburn, and, though not condemned, was refused a full acquittal, and afterward made an unsuccessful effort to obtain a commission in the continental army. When Boston fell into the hands of the patriots he carried to England the despatches announcing that event. There he was employed by Lord George Germain, secretary of state for the department of the colonies, and in 1780 became under secretary of state. After the retirement of Lord Germain in 1781 Mr. Thompson returned to America, and there formed a regiment of dragoons, of which he received the command with the rank of lieutenant colonel. Returning to England at the close of hostilities, he obtained leave of absence to visit the continent of Europe, and by permission of the English government entered the service of the elector of Bavaria, who knighted him. Toward the end of 1784 he settled in Munich with the appointment of aide-de-camp and chamberlain to the elector. Here he reorganized the entire military establishment of Bavaria. In the beginning of 1790 he undertook to suppress beggary in Bavaria, which had become a profession, and inculcated habits of industry and order in the people of the lower class. In this he was successful, and was also wholly or partially so in the establishment of a military school, the improvement of the breed of horses and of horned cattle, and the conversion of an old hunting ground near Munich into a park, where after his departure the inhabitants erected a monument in his honor. He had been successively raised to the rank of a major general in the army, member of the council of state, lieutenant general, commander-in-chief of the general staff, minister of war, and count of the holy Roman empire, on which occasion he chose as a title the name of the place in America in which he had resided. His health failing under his ar-

duous labors, he made a tour in Italy; but not finding himself recovered, he visited England, reaching that country in September, 1795, and on his arrival in London was robbed of a trunk containing all his private papers and original notes and observations on philosophical subjects. Returning to Bavaria when that country was threatened by the war in 1796 between France and Germany, he was appointed head of the council of regency during the absence of the elector, and maintained the neutrality of Munich; for this service many honors were conferred upon him, one of which was an appointment to the superintendency of the general police of the electorate. As the climate did not agree with him, after spending two years in public duties and private studies, he determined to fix his residence in England, and was named minister to the court of St. James; but the English government, acting on the rule of inalienable allegiance, refused to recognize him in this capacity. While in England he was largely concerned in the affairs of the royal institution, of which he was the real founder. After the death of Charles Theodore, elector of Bavaria (1799), Rumford gave up his citizenship in the electorate, and finally settled at Paris. He married in 1804 for his second wife the widow of Lavoisier, and with her retired to the villa of Auteuil, the residence of her former husband, where he spent the remainder of his life. He contributed a large number of papers to various scientific journals. The subject to which he devoted his philosophical investigations more than any other was that of heat, and what has been done to demonstrate experimentally the doctrine of "correlation of forces" was begun by him in a series of experiments suggested by the heat evolved in boring cannon at the arsenal in Munich. (See **CORRELATION OF FORCES**.) For Count Rumford's claim to having very nearly established the "mechanical equivalent of heat," see a paper by Prof. Robert H. Thurston in the "Transactions of the American Society of Civil Engineers," vol. ii., p. 289; also Tyndall's "Heat as a Mode of Motion." Rumford also devoted a good deal of attention to the construction of chimneys, with principal reference to remedies for their smoking, and wrote popular essays on the subject. His investigations into the strength of materials and the force of gunpowder resulted in great improvements in artillery; and on the subjects of light and illumination he also made many experiments and discoveries. Some years before his death he instituted prizes for discoveries in light and heat, to be awarded by the royal society of London and the American academy of sciences, of which he himself received the first on the former subject from the royal society; and he bequeathed to Harvard university the funds by which was founded the Rumford professorship of the physical and mathematical sciences as applied to the useful arts, which was

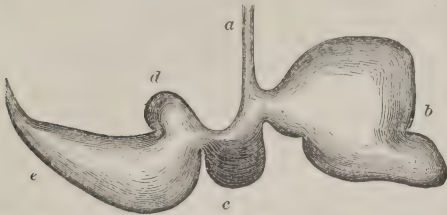
established in October, 1816.—The results of his investigations were published in pamphlets and essays, in French, English, or German. A complete edition of his writings has been published in 4 vols., with his life by the Rev. G. E. Ellis (Philadelphia, 1871). See also his life by Prof. Renwick, in Sparks's "American Biography," 2d series, vol. v.

RUMIANTZEFF, or **Romantsoff**, **Petr**, count, a Russian general, born in St. Petersburg in 1725, died in Mohilev in December, 1796. During the seven years' war he coöperated with Soltikoff in defeating Frederick the Great at Kunersdorf (1759), and captured the fortress of Colberg (1761). In 1770 he became commander-in-chief against the Turks, and defeated in two battles much superior forces on the Pruth and the Kagul, which gave to Russia the whole left bank of the Danube. In 1774 he compelled the Turks to conclude a peace at Kutchuk-Kainarji; and after being made field marshal, he was presented with a large domain. In 1787, on the renewal of the war with Turkey, he and Potemkin were placed in command; but Rumianteff declined serving with Potemkin and retired.

RUMINANTIA (Lat. *ruminare*, to chew the cud), a group of ungulate even-toed mammals, characterized by the absence of incisors in the upper jaw in almost all cases, their place being supplied by a callous pad; six lower incisors; canines inconstant; molars usually six on each side in each jaw, with flattened crowns and irregularly crescentic folds of enamel; stomach compound, with three or four cavities, in connection with the act of rumination; cæcum large; placenta generally cotyledonous; and feet ungulate and bisulcate. This group is equivalent to the *pecora* of Linnæus, and includes such animals as the camel, deer, giraffe, antelope, gnu, goat, sheep, and ox. Almost all the genera are provided with horns, solid and deciduous as in the deer, or hollow and permanent as in the ox and sheep. They are large or moderate in size, and generally rapid runners; they feed in herds, headed by an old male, and are exclusively herbivorous; the shape in most is light and elegant, and the limbs long and slender; the skin is covered with hair or wool; the eyes are large, full, and often very beautiful; the ears long, erect, very movable, and more or less pointed; the tail varies much in length and covering. They inhabit vast plains, the forests of the north, and the dry deserts of the tropics, their speed taking them in a few hours from an exhausted to a rich feeding ground, and from a sandy waste to a well watered region. They wage no war on each other or on other animals, except during the pairing season; taking to flight at slight causes of alarm, when brought to bay they fight boldly with their horns and antlers, and strike powerful blows with their sharp front hoofs.—The deciduous horns of the ruminants may be rounded as in the stag, roebuck, and Vir-

ginia deer, or palmated as in the moose, reindeer, and fallow deer; they are usually symmetrical as to position and size, but not as to arrangement of the divisions; there is an intimate connection between the horns and the generative system, as their development may be arrested and their periodical shedding prevented by castration. There are seldom more than two; but in the fossil *sivatherium* of the tertiary of the Sivalik hills there are four, also in the four-horned sheep, goats, and antelopes; sometimes there are even five in the domesticated sheep. The solid horns have been described under **BUCK**, and **DEER**; these antlers fall by a process having a close resemblance to that by which in necrosis the dead is separated from the living bone; after the pairing season has passed the circulation stops in the horns, and they become dry and dead, and separate from the frontal bone by absorption carried on by the Haversian canals; these, acting on one plane through the whole thickness of the bone just below the burr, remove the solid materials around them, so that each canal finally unites its cavity with that of an adjoining one; when this has extended entirely across the base the antler falls. Prof. J. Wyman ("Proceedings of the Boston Society of Natural History," vol. vii., p. 168, 1859) regards the antlers as dermal bones rather than parts of the internal skeleton, because they are developed in the integuments by a special centre of ossification, and become attached to the frontal only after ossification has somewhat advanced. In the hollow horns of the ox, sheep, and antelopes, the frontal bony cores are cylindrical shafts, more or less solid, protected by periosteum and an extension of the true skin, of which the epidermic portion is developed into a dense horny sheath; in most the frontal sinuses extend into the cores.—The tongue generally performs the office of prehension as well as deglutition; the anterior part collects and judges by the touch of the nature of the food, the next portion prepares the morsel and thrusts it backward toward the oesophagus, and the basal part regulates the movements of the whole organ from its insertion in the hyoid bone; the papillæ, fungiform and filiform in front, conical and circumvallate behind, are largely developed. The salivary glands are large, with long ducts; tonsils bulky, and oesophagus thick and muscular. The stomach is fourfold, the first three cavities (paunch or *rumen*, honeycomb bag or *reticulum*, and manyplies or *psalterium*) being essentially dilations of the oesophagus for the purpose of rumination, and leading to the fourth or true digestive cavity; in the fourth or *abomasum*, the only one developed in the newly born animal, there is in the calf an organic acid secreted, possessing the power of converting the albumen of milk into curd or whey, in the prepared condition called rennet. Concretions of balls of hair, the result of hairs swallowed when licking their own or others' hides,

felted together by the movements of the stomach, and incrustated with a polished earthy deposit of great hardness, are often found in the stomachs of ruminants, especially of the cow.



Stomach of a Sheep.—*a*. Œsophagus or gullet. *b*. Rumen, paunch, or first stomach. *c*. Reticulum, honeycomb, or second stomach. *d*. Psalterium or manyplies. *e*. Abomasum, fourth or true stomach.

The intestinal canal is very long and simple; compared with the length of the body it is, according to Meckel, as 12 to 1 in the camel and deer, 22 to 1 in the ox, and 28 to 1 in the sheep; the large intestine is often scarcely wider than the small; the cæcum is always large, smooth, and without lateral bulgings. The eyes are wide apart, and so prominent that the range of vision is very extensive; the opening of the pupil is transverse, and the *tapetum* is exceedingly brilliant. The senses of hearing and smell are highly developed, and the cranial sinuses are extensive. The mammae are inguinal, and the teats four, except in sheep and goats, which have only two. The *panniculus carnosus* muscle is remarkably developed, serving as a means of defence by shaking off flies and other stinging insects from the skin. In the camel there is a hump on the back, consisting principally of adipose matter developed in the subcutaneous areolar tissue, probably serving as a storehouse of nutriment to the animal during its long fasts in the desert. The hair is generally coarse, and never what would be called fur; it varies from the harsh and shaggy coat of the camel and the somewhat softer one of the llama to the fine wool of the sheep. Rumination is rendered necessary by the bulky character of the food as compared with its nutrient qualities; the timid animals of this order are naturally forced to take in a large amount of food in a short time, and then to flee from the carnivorous beasts always lying in wait for them to some retired place where they can remasticate it quietly. In camels the bolus is triturated alternately from side to side; in horned ruminants and in the giraffe it is always in one direction, either from right to left or from left to right.—Ruminants embrace the animals most useful to man and the most easily domesticated; whole races of men count their wealth by the numbers they possess of them, whether camels, llamas, goats, sheep, reindeer, or cattle. They are distributed all over the world except in Australia; the reindeer and musk-ox are found in the polar regions of both hemispheres, the llamas and alpacas in South America, the cam-

els in Asia and Africa, the giraffe and most antelopes in Africa, and the deer everywhere in suitable feeding places; in North America there are only two antelopes, only one of the sheep family, and two of the ox family; there are no hollow-horned ruminants in South America as original species, though there are vast herds of wild cattle of foreign introduction. The distribution of fossil ruminants was in some respects different from that of the living species; for instance, the giraffe has been found fossil in France and the Sivalik hills, showing a warmer climate than now prevails in those regions; on the contrary, the reindeer has been found in S. Europe, indicating also a temporary diminution of heat, probably from the extension southward of the ice during the glacial period. There are many interesting coincidences of geographical distribution in geological and the present times, bearing on the point of the origin of existing mammals, and in favor of the theory of such origin from the development of previously existing types, rather than from a distinct creative act after the entire destruction of the preceding fauna. Camels are found fossil in the Sivalik hills of India, llamas in the caverns of Brazil, musk deer in Asia and Africa, &c.; deer (*cervidae*) are numerous in the diluvial formations of Europe, greatly resembling the present species, and, according to Pietet, some may be considered as the stock from which have been derived the present stag, reindeer, fallow deer, and roebuck, these, with also the goat and sheep, having survived the catastrophes of this disturbed period, and preceded the appearance of man in Europe. The fossil deer of Asia and America also very much resemble the existing species of these continents. The urus described by Julius Cæsar (*De Bello Gallico*, vi. 28) among the animals of Germany, and the aurochs even now living in the forests of Lithuania, are interesting in connection with the origin of domestic cattle; these were probably indigenous, as a fossil urus and aurochs have been found in the diluvium of Europe. The fossil musk ox (*ovibos*) has been found in Siberia and North America, like the one now living in the polar regions. The ruminants show more transitions to other orders than would be supposed from the study of their living species, especially in the direction of the odd-toed ungulates; they appeared after the latter, and under forms very nearly resembling existing species; there were none in the eocene tertiary, when almost all herbivorous mammals were of the latter, but appeared first in the miocene, and then became so numerous that in the subsequent epoch (pliocene) and during the diluvium they had entirely displaced the latter, at least in Europe. The *svotherium* of the Sivalik hills resembled proboscideans in its heavy form, short neck, and probable trunk (as indicated by the nasal bones). Among the gigantic animals of this order may be mentioned the great Irish elk, with enormous horns,

found in the diluvium of Europe. The genus *macrauchenia*, as large as a rhinoceros, is peculiar to the southern regions of South America, and forms another remarkable transition form between ruminants and proboscideans. (See *MACRAUCHENIA*.)

RUMSEY, James, an American inventor, born at Bohemia Manor, Cecil co., Md., about 1743, died in London, England, Dec. 23, 1792. In September, 1784, he exhibited on the Potomac, in the presence of Gen. Washington, a boat which worked against the stream by means of mechanism. He subsequently gave his attention to steam as a motive power, and in March, 1786, propelled a boat on the Potomac by a steam engine, which secured motion by the force of a stream of water thrown out by a pump at the stern. In December, 1787, the experiment was successfully repeated on a larger scale. About the same time he became involved in a controversy with John Fitch. (See *FITCH, JOHN*.) In 1788 the "Rumsey society" was formed in Philadelphia; and the inventor going to England, a similar society was formed in London, a boat and machinery were built for him, and he obtained patents for his inventions in Great Britain, France, and Holland. A successful trip was made upon the Thames in December, 1792, and he was preparing for another experiment when he died. He published a "Short Treatise on the Application of Steam" (1788).

RUNES (Old Norse, *rúnir*, secret signs, mysteries), an ancient graphic system employed chiefly by the Teutonic races of northern Europe, though traces of its use are found also in France and Spain. These characters originally served for divination and secret purposes, but it is not known at what time their use began. Specimens of runic writing have been found at Thorsbjerg and Nydarn dating from the 2d or 3d century; and though they were gradually superseded by the Roman alphabet, the runes remained partially in use in out-of-the-way districts of Scandinavia till the close of the last century. There are several varieties of runic writing, classed as the Anglo-Saxon, the German, and the Norse. The last is thought to represent the oldest form, from which the others were developed. It has an alphabet of only 15 or 16 letters, while that of the Anglo-Saxons finally numbered as many as 40. Among the variations, *Æ*, sometimes stands for O,

for N, *for S*, *for T*, *for D*, and *for E*. These variations in the forms of the letters, and the fact that they

are sometimes read from left to right, sometimes from right to left, and sometimes alternately from the right and left, greatly increase the difficulty of deciphering them; but as 61 runic alphabets, or *futhorcs*, as they are called from the first six letters, have been gathered, it is possible to read any well preserved inscription with tolerable certainty. There is no evidence that runes were ever employed in the composition of books, or that they were used as familiarly and generally as other graphic systems. They were confined to inscriptions or carvings on rocks, stones, household utensils, weapons, and ornaments. They were also cut on smooth sticks, called *rún-stafur*, or mysterious staves, generally of beech (Ger. *Buche*, whence *Buchstab*, letter), used for divination. It was even believed that a mysterious power resided in the runes, and some of them were considered as special safeguards of ships, others as capable of healing wounds, &c. The use of the runes, thus associated in popular belief with sorcery, was discouraged by Christian missionaries.—Whatever valuable statements in regard to the nature of runes are to be found in the manuscripts of the middle ages have been gathered in Brynjulfssen's *Periculum Runologicum* (1823). See also Grimm, *Ueber deutsche Runen* (1821) and *Zur Literatur der Runen* (1828); and Stephens, "Old Northern Runic Monuments of Scandinavia and England" (3 vols., London, 1867-'74).

RUNJEET SINGH, a rajah or sovereign of the Sikhs, in the Punjab, born at Gujerawala, N. of Lahore, about 1780, died there, June 27, 1839. He was the son of Maha Singh, sirdar or governor of one of the Sikh states, who when he died (1794) left the government of his province to Runjeet, under the regency of his mother, whom the young sirdar is said to have poisoned when he arrived at the age of 17, in order that he might reign alone. He rapidly and skilfully availed himself of the wealth and influential position to which he had succeeded, and became the recognized leader of the Sikh confederacy W. of the Sutlej. A service to the Afghan monarch obtained for him the title of king of Lahore, by which he was generally known to Europeans. In 1807, having taken from the Afghans several important towns situated on the W. bank of the Indus, and established his position as sovereign of the Sikhs in the Punjab, he endeavored to extend his power over the Sikh territories lying between the Sutlej and the Jumna, and for this purpose advanced into that region. The chiefs of Sirhind demanded protection from the British government, which was granted; but not until an English army advanced to the banks of the Sutlej, in 1809, did Runjeet Singh relinquish his claim of authority. On April 25 of that year he concluded a treaty with the English at Amritsir, making the Sutlej substantially the boundary between his possessions and those of the East India company. He now reorganized his army by the aid of European

officers, and ten years later had not only reduced every sirdar in the Punjab to subjection, but was master of the Afghan city of Peshawer, and had assumed the title of *maharajah* (king of kings). By the employment of two skilful French officers, Allard and Ventura, in 1822, he brought his troops to a still higher degree of efficiency, forming a disciplined army of 80,000 men, with 300 guns. He now crossed the Indus and took the province of Peshawer lying along its W. bank. His conquests in Afghanistan occupied him for several years. In 1838 he entered into negotiations with the British for a closer alliance, but died before they were concluded. He was remarkable for his success in harmonizing the interests of the various Sikh states, no less than for his military achievements; and for fidelity to treaty engagements his name is conspicuous among native princes of India.

RUNNELS, a W. county of Texas, intersected by the N. fork of the Colorado river; area, 750 sq. m.; returned as having no population in 1870. The soil in the valleys of the streams is good. The county is adapted to stock raising, but is subject to Indian incursions.

RUNNERS. See ORTHOPTERA.

RUNNYMEDE, *Runnimeede*, or *Runnemeede*, a narrow slip of meadow land on the right bank of the Thames near Egham, in the N. W. part of the county of Surrey, England, about 20 m. W. S. W. of London, memorable as the place where in 1215 King John was compelled by his barons to sign the Magna Charta. The Egham races now take place upon this meadow.

RUPERT, Prince (Prince Robert of Bavaria), a royalist general of horse during the English civil war, born in Prague, Dec. 17, 1619, died at Spring Gardens, London, Nov. 29, 1682. His mother Elizabeth was the eldest daughter of James I. of England, and the wife of Frederick V., elector palatine, who on the outbreak of the thirty years' war was elected by the insurgents king of Bohemia, and in consequence was deprived of his estates. When only 13 years old Rupert took part in the siege of Rheinberg, and at 18 commanded a regiment of cavalry in active service. At the beginning of the civil war in England he was placed at the head of a regiment of horse. He took Hereford, Lichfield, and Cirencester, and bore a prominent part in the battles of Edgehill and Chalgrove field. His daring and vigor had more than compensated for his want of prudence and military sagacity, and he was created duke of Cumberland. With Prince Maurice he carried Bristol by assault on July 25, 1643. Afterward he scattered the parliamentary forces at Newark, and gained distinction in the north of England, especially by the relief of Latham house, held by the countess of Derby against a detachment of Fairfax's army. The loss of the battle of Marston Moor was due to his rashness and his want of concert with the duke of Newcastle; yet he was promoted from the generalship of

the horse to the command of all the forces, and took the city of Leicester. In the battle of Naseby, June 14, 1645, Prince Rupert commanded the left wing, and pursued the portion of the parliamentary army opposed to him a great distance, returning to find his own side defeated. Subsequently he took command of Bristol. The city was invested by Fairfax and Cromwell on Aug. 22, and was surrendered at the first attack (Sept. 11), the prince marching out with a convoy of two regiments of horse, and proceeding to Oxford. The same day a royal proclamation was issued revoking and annulling all military authority given to "our nephew Prince Rupert;" but in 1648 he obtained the command of that portion of the fleet which adhered to the royal cause, and with it went to the coast of Ireland to assist Lord Ormond. Anchoring in the harbor of Kinsale, he was there blockaded by Blake with the parliamentary fleet until October, 1649, when he forced his way out with the loss of a few ships. Blake pursued him to Malaga, and in January, 1651, attacked his squadron, and destroyed all but two ships, with which the prince escaped to the West Indies. There he remained some time, supporting himself by the piratical capture of Spanish and English merchantmen, and then returned to France, selling his ships to the French government in behalf of Charles II. After the restoration he was made privy councillor. Under the duke of York he held a command in the fleet, and was present at the naval battle of Lowestoft (1655). In 1666, in conjunction with Lord Albemarle, he held command of the fleet which acted against the Dutch with various success. He was a promoter of the Hudson Bay company, and its first governor in 1670. During the latter years of his life he was governor of Windsor castle, and spent a large portion of his time in painting and engraving, and in mechanical and chemical experiments. The invention of the mezzotint has been ascribed to him, but it was made some years earlier. He improved the mechanical mode of the art, and described it in a communication to the royal society in 1662, and some of his engravings are still in existence. He is believed to have been the inventor of pinchbeck or prince's metal, and of the glass bubbles called "Rupert's drops." (See ANNEALING.) He was buried in Henry VII.'s chapel, Westminster.—See *Leben des Prinzen Ruprecht von der Pfalz, Anführer der Cavaliere Karl's I. von England*, by Treskow (2d ed., Berlin, 1857), and *Pfalzgraf Rupert der Cavalier*, by Spruner (Munich, 1854).

RUPERT'S DROPS. See ANNEALING.

RUPERT'S LAND. See NORTHWEST TERRITORIES.

RUPHIA, a river of Greece. See ALPHEUS.

RÜPPELL, *Wilhelm Peter Eduard Simon*, a German traveller, born in Frankfurt, Nov. 20, 1796. He early visited Italy and Egypt, and subsequently explored northern Africa, and

especially Abyssinia. He presented his collections to his native town in consideration of an annual pension of 1,000 florins. His works include *Fundgruben des Orients* (5 vols., Vienna, 1818); *Reisen in Nubien, Kordofan und dem peträischen Arabien* (Frankfort, 1829); *Reise in Abessinien* (2 vols., 1838-'40); and *Vögel Nord- und Ostafrikas* (1845).

RUPTURE. See HERNIA.

RUREMONDE. See ROERMOND.

RURIK, founder of the first Russian dynasty. See RUSSIA.

RUSCHENBERGER, William S. W., an American naturalist, born in Cumberland co., N. J., Sept. 4, 1807. He studied medicine in the university of Pennsylvania, became a surgeon in the United States navy in 1826, and as such circumnavigated the globe. He has published "Three Years in the Pacific" (8vo, Philadelphia, 1834); "A Voyage round the World, including an Embassy to Muscat and Siam" (1838); "Elements of Natural History" (2 vols. 12mo, 1850); "A Lexicon of Terms used in Natural History" (12mo, 1850); and "Notes and Commentaries during a Voyage to Brazil and China in the Year 1848" (8vo, 1854).

RUSH (written by the old authors *rish*, *resh*, and *rashes*, probably from the A. S. *risc*), the common name for species of *juncus*, but used in combination, as bog rush and scouring rush, for plants of other genera. *Juncus* (Lat. *jungere*, to join, the stems having been used for tying) is the typical genus of a small family of endogenous plants, the *juncaceæ*, which, while they have the glumaceous (husk-like) flowers and general appearance of the sedges and grasses, are closely related to the lily family, the structure of the flowers, though greenish and glume-like, being much like that of a minute lily. Dr. George Engelmann, in his monograph of the genus *juncus* (St. Louis academy of sciences, 1868), finds about 50 species in all North America, of which 17 occur also in other parts of the world; four species are found all over the country, and five others everywhere east of the Mississippi; others are very local, especially the maritime and arctic species. The rushes are mostly perennials, growing in water or in wet soil, with pithy or hollow, rarely branching stems, which in some are without leaves, in others with leaves flat and grass-like, while a number have cylindrical leaves, marked by cross partitions. The flowers are in panicles, which are terminal, or in some appear lateral, as the involucre sheath continues beyond the panicle like a prolongation of the stem; the flowers, arranged on the branches of the panicle singly or in little clusters, are from one to three lines long, greenish or brownish, the six-parted perianth with three outer and three inner divisions; stamens six, sometimes reduced to three; pistil with three styles, the many-seeded pod one- or three-celled. Some species are only 1 to 3 in. high, and the larger ones reach as high as 4 ft. Though interesting plants to botanists,

the rushes are of little economical importance. The sea and sharp rush (*J. maritimus* and *J. acutus*) of Europe grow in the maritime sands, and are sometimes planted in order that their roots may retain the earth of embankments in place; the common or soft rush (*J. effusus*) is disposed to spread and be a weed in wet pastures, and is troublesome in southern rice fields; the toad rush (*J. bufonius*), the only annual species in the eastern states, is very common along roadsides and on the edges of footpaths, it seeming to flourish best where it is trodden upon. The most important species is that popularly called black grass, *J. Gerardi* (given in some works as *J. bulbosus*, which is a European species not yet found in this country), abundant in salt marshes the whole length of the Atlantic coast, where it is conspicuous by the dark brown color of its flowers; when cut early it makes a hay that is much relished by animals, and salt-marsh hay is regarded as



Common or Soft Rush (*Juncus effusus*).

valuable in proportion to the amount of this it contains.—Formerly rushes were used as a substitute for carpets; the floors of public buildings and of the houses of the wealthy were strewn with them, a practice which was continued as late as the 16th century. The Japanese use the common rush for making mats, which serve for carpets and for beds; light mats of the same material and covered with transparent paper are used as window curtains. The use of rushes and flags for bottoming chairs was formerly common, and the material serves for weaving small baskets; the street flower venders sometimes offer their wares arranged in neat baskets made from green rushes. The Chinese use the pith of some species for candle wicks, and the rush lights formerly in use by the poor classes in England were made of the pith of the common rush, peeled in such a manner as to leave a narrow strip of the rind on each side as a support.—Bulrush

is one of the sedges (*scirpus lacustris*); scouring rushes are equisetums. (See HORSETAIL.)

RUSH. I. A S. E. county of Indiana, drained by Blue river and Flat Rock creek; area, 410 sq. m.; pop. in 1870, 17,626. The surface is undulating and the soil fertile. It is intersected by the Columbus branch of the Jeffersonville, Madison, and Indianapolis railroad, and by the Cincinnati, Hamilton, and Indianapolis railroad. The chief productions in 1870 were 667,007 bushels of wheat, 1,333,421 of Indian corn, 69,236 of oats, 58,359 of potatoes, 11,038 tons of hay, 63,227 lbs. of wool, 389,552 of butter, 21,576 of maple sugar, and 16,989 gallons of sorghum and 20,359 of maple molasses. There were 7,799 horses, 5,123 milch cows, 10,994 other cattle, 15,921 sheep, and 40,552 swine; 10 manufactories of bricks, 15 of carriages and wagons, 5 of saddlery and harness, 5 flour mills, 15 saw mills, and 3 woollen mills. Capital, Rushville. II. A W. central county of Kansas, intersected by Walnut creek, an affluent of the Arkansas, and watered by other streams; area, 900 sq. m. It is not included in the census of 1870. The surface consists chiefly of undulating prairies, and the soil is productive.

RUSH. I. Benjamin, an American physician, born in Byberry township, near Philadelphia, Dec. 24, 1745, died in Philadelphia, April 19, 1813. He graduated at Princeton college in 1760, studied medicine, chiefly at Edinburgh, and was elected professor of chemistry in the medical college of Philadelphia. In the provincial conference of Pennsylvania he was chairman of the committee which reported that it had become expedient for congress to declare independence. When congress had decided on taking that step, five members from Pennsylvania withdrew, whereupon Rush and four others were elected to fill their places; and he was one of the signers of the Declaration of Independence. The same year (1776) he married Julia, daughter of Richard Stockton of New Jersey, also one of the signers. In April, 1777, he was made surgeon general of the army for the middle department, and in July physician general. He wrote four letters to the people of Pennsylvania on their constitution of 1776, which he censured, and which was soon superseded by a new form of government. In February, 1778, he resigned his post as physician general, on account of the wrongs done to the soldiers in regard to the hospital stores. In the latter part of his life he was a professor in the Philadelphia medical college. In 1793, during the ravages of the yellow fever, he rendered extraordinary services. His bold and original practice, however, made him enemies, and a paper edited by William Cobbett, called "Peter Porcupine's Gazette," was so violent in its attacks that it was prosecuted, and a jury rendered a verdict of \$5,000 damages. From 1799 till his death he was treasurer of the United States mint. He published "Medical Inquiries and Observations"

(5 vols. 8vo, 1789-'98; 3d ed., 4 vols., 1809); "Essays, Literary, Moral, and Philosophical" (1798; 2d ed., 1806); "Sixteen Introductory Lectures," &c. (1811); "Diseases of the Mind" (1812; 5th ed., 1835); and editions of Sydenham's and other medical works. His "Medical Tracts," containing a variety of essays upon health, temperance, exercise, &c., appeared in a separate volume at an early period of his life. In 1791 he wrote an able defence of the use of the Bible as a school book. He was one of the founders of Dickinson college, and was president of the society for the abolition of slavery, and for some time of the Philadelphia medical society, and was vice president of the Philadelphia Bible society, and of the American philosophical society. II. Richard, an American statesman, son of the preceding, born in Philadelphia, Aug. 29, 1780, died there, July 30, 1859. He graduated at Princeton college in 1797, studied law, and was appointed attorney general of Pennsylvania in 1811, and soon after comptroller of the United States treasury. From 1814 to 1817 he was attorney general of the United States. In 1817 he was temporary secretary of state, and was then appointed minister to England, where he remained till 1825, negotiating several important treaties, especially that of 1818 with Lord Castlereagh respecting the fisheries, the N. W. boundary line, conflicting claims beyond the Rocky mountains, and the slaves of American citizens carried off in British ships contrary to the treaty of Ghent. In 1825 President Adams made him secretary of the treasury. In 1828 he was a candidate for the vice presidency on the same ticket with President Adams and received the same number of electoral votes. In 1829 he negotiated in Holland a loan for the corporations of Washington, Georgetown, and Alexandria. In 1836 President Jackson appointed him commissioner to obtain the Smithsonian legacy (see SMITHSON, JAMES), then in the English court of chancery; and in August, 1838, he returned with the entire amount. In 1847 President Polk appointed him minister to France, and in 1848 he was the first of the foreign ministers at the French court to recognize the new republic, in advance of instructions from his government. At the close of President Polk's term he asked to be recalled, and spent the rest of his life in retirement. In 1815 he compiled an edition of the laws of the United States; in 1833 he published "Memoranda of a Residence at the Court of St. James," and in 1845 a second volume of the same work, "comprising Incidents, Official and Personal, from 1819 to 1825; among the former, Negotiations on the Oregon Territory" (3d ed., under the title "The Court of London from 1819 to 1825," with notes by the author's nephew, London and Philadelphia, 1873). In 1857 he published "Washington in Domestic Life." His sons published in 1860 a volume of his "Occasional Productions, Political, Diplomatic, and Miscellaneous, including a Glance

at the Court and Government of Louis Philippe and the French Revolution of 1848."

RUSHWORTH, John, an English compiler, born in Northumberland about 1607, died in London, May 12, 1690. He studied at Oxford and at Lincoln's Inn, and was called to the bar, but never practised. From 1630 he took notes of all important proceedings in the higher courts and in parliament. He was assistant clerk and messenger of the house in the long parliament, from 1645 to 1650 assistant secretary to Lord Fairfax, and afterward for many years a member of parliament. From 1684 till his death he was in prison for debt. The first part (1 vol. fol.) of his "Historical Collection of private Passages of State, weighty Matters in Law, and remarkable Proceedings in Parliament," covering the proceedings from 1618 to 1629, appeared in 1659; the second part, from 1629 to 1640, and the "Trial of the Earl of Strafford," in 1680; and the other parts were ready for the press at his death. The whole work was reprinted in 1721, in 7 vols.

RUSK. I. An E. county of Texas, bordered N. by the Sabine river, and watered in the north by its branches and in the south and west by those of the Angelina; area, 1,025 sq. m.; pop. in 1870, 16,916, of whom 7,715 were colored. Iron ore is abundant, and there are some mineral springs. The chief productions in 1870 were 347,561 bushels of Indian corn, 73,556 of sweet potatoes, 12,752 bales of cotton, 8,718 lbs. of wool, and 108,301 of butter. There were 1,904 horses, 1,337 mules and asses, 11,251 cattle, 3,607 sheep, and 21,785 swine. Capital, Henderson. **II.** A W. central county of Dakota, recently formed and not included in the census of 1870; area, about 1,600 sq. m. It is bounded E. by the Missouri river, and intersected by the Morean. The W. portion is occupied by Elk ridge. The surface is chiefly rolling prairies.

RUSKIN, John, an English author, born in London in February, 1819. He is the son of a London merchant, from whom he inherited a large fortune, and graduated in 1842 at Christ Church college, Oxford, having in 1839 gained the Newdigate prize for English poetry. Immediately afterward he devoted himself to the study of art, and to water-color painting. In 1843 he published "Modern Painters: their Superiority in the Art of Landscape Painting to all the Ancient Masters. By a Graduate of Oxford." It attracted attention from the brilliancy of its style, the eloquence of its descriptive passages, and particularly the summary manner in which the most distinguished landscape painters of the old and new schools were disposed of, and Turner's supremacy advocated. Among critics and connoisseurs its reception was generally hostile, but it gained admirers and disciples, and in 1846 was republished in a greatly enlarged form, accompanied by a second volume treating "Of the Imaginative and Theoretic Faculties," to which, after an interval of ten years, a third and fourth

were added; and in 1860 the work was completed by a fifth volume, the last three volumes containing illustrations by the author. Mr. Ruskin subsequently revised this work, making many alterations (5 vols. 8vo, London, 1860-'67). At the time of its completion in 1860 the original title had become a misnomer, the work being for the most part a philosophical treatise on landscape painting. The collection of materials for this work involved long visits to various parts of continental Europe, and in the cities of Italy, especially in Venice, the contemplation of the more striking mediæval buildings inspired Ruskin with the idea of a reform in domestic architecture. The result was his "Seven Lamps of Architecture" (8vo, 1849), and "The Stones of Venice" (3 vols., 1851-'53), both works illustrated by himself. In 1851 he began a series of "Examples of the Architecture of Venice," from his own designs, of which but three parts appeared. Among his other architectural publications are a pamphlet entitled "The Opening of the Crystal Palace, considered in some of its Relations to the Prospects of Art," mainly devoted to a scheme for the preservation of Gothic buildings and works of art, and "The Study of Architecture in our Schools" (1865). His "Notes on the Construction of Sheepfolds" (1851) is a discussion of church discipline and doctrine rather than of church building. The pre-Raphaelite movement in the British school of painting early enlisted the sympathy of Ruskin, who alleged that the principles on which Hunt, Millais, and their followers proceeded had first been enunciated in his own works; and in his pamphlet "Pre-Raphaelitism" (1851), his "Notes" on the royal academy exhibitions of 1855-'60, and elsewhere, he has recorded his admiration of the productions of the new school. In his "Notes" on Turner's pictures and drawings exhibited in Marlborough house, published in 1857, he astonished the public by severe strictures on that painter. In 1867 he was appointed Rede lecturer at Cambridge, and received from the university the degree of LL. D. In 1869 he was elected professor of fine arts in the university of Oxford. In 1871 he gave £5,000 to endow a master of drawing in the Taylor galleries, Oxford. He has published several courses of lectures to artisans and others, among which are: "Architecture and Painting" (1854); "The Political Economy of Art" (1858); "The Two Paths," being lectures on decoration and manufacture (1859); "Sesame and Lilies," on books and reading (1864); "The Ethics of the Dust," on the elements of crystallization (1865); "The Crown of Wild Olive," on work, traffic, and war (1866); "Lectures on Art," delivered at Oxford (1870); "The Eagle's Nest" and "Aratra Pentelici," on the elements of sculpture (1872); and "Ariadne Florentina," on engraving (1874). He has also published "Elements of Perspective," with 80 diagrams (1839); "The King of the Golden River," a Christ-

mas fairy tale (1851); a notice of "Giotto and his Works" (1855), prepared for a collection of engraved outlines of the frescoes of that master, published by the Arundel society, of which Ruskin was one of the founders; "Elements of Drawing, in three Letters for Beginners" (1857), one of his most practical and useful treatises; "Unto this Last," essays on political economy (1862); "Time and Tide, by Weare and Tyne," letters on the laws of work (1867); and "The Queen of the Air," a study of the Greek myths of cloud and storm (1869). He is the author of the illustrative text in Turner's "Harbors of England," and of many contributions to the "Quarterly Review" and other periodicals, of which some of the more important are the reviews of Lord Lindsay's "Christian Art" and Eastlake's "History of Oil Painting," in the "London Quarterly," and a biographical notice of Samuel Prout in the "Art Journal." In January, 1871, he began a series of monthly letters to working men, under the general title "Fors Clavigera," which are still continued (1875), and have been gathered into volumes. Several volumes of selections from his works have appeared, the best of which are "Art Culture," a treatise ingeniously constructed from selected passages (published only in New York, 1872), and "Frondees Agrestes," readings from "Modern Painters" (1875), with critical notes by himself. A series of articles on the "Poetry of Architecture," which appeared in a London magazine in 1837-'8, under the signature of "Kata Phusin," have been collected and added to his works, as he tacitly admits their authorship. His latest publications are: "Mornings in Florence" (first part), "Proserpina, Studies of Wayside Flowers" (parts i. and ii.), "Love's Meinie," "Notes on some of the Pictures in the Exhibition of the Royal Academy," "Deucalion," and "Val d'Arno" (1875). Besides his numerous writings, he has engaged in or announced various schemes for the benefit of different classes of society.

RUSS, John Denison, an American physician, born at Chebacco (now Essex), Mass., Sept. 1, 1801. He graduated at Yale college in 1823, studied medicine at home and in Europe, and began to practise in New York in 1826. In 1827 he went to Greece with a cargo of supplies from Boston, and remained there three years, superintending for 15 months a hospital which he had established at Poros. After his return to New York he began at his own expense, early in 1832, the instruction of six blind boys, and was appointed the same year superintendent of the New York blind institution. While here he invented a phonetic alphabet for the blind, consisting of 41 characters, sufficiently like the Roman letters to be read by any one, to which he added 22 prefixes, suffixes, &c. He also simplified the mathematical characters for the blind, using four instead of ten, and printed maps for them from raised designs, using wave lines for water, &c., instead of the

plan of marking the boundaries with a cord. The maps, with some slight change, are still in use, but the figures have been superseded by Braille's system. (See **BLIND**.) The phonetic system of writing was never generally introduced. Dr. Russ took part in founding the New York prison association, of which he was successively the secretary and vice president. From 1851 to 1858 he was superintendent of the juvenile asylum. He has also been engaged in other philanthropic enterprises, among them a house of employment for women, especially for those desirous of reforming from a vicious life, which was established in 1850 under the charge of his wife and daughter.

RUSSELL, I. A S. W. county of Virginia, bordered S. E. by the Clinch mountains and intersected by Clinch river; area, about 700 sq. m.; pop. in 1870, 11,103, of whom 1,167 were colored. It has a mountainous surface and some good soil in the valleys, and contains iron ore, coal, and marble. The chief productions in 1870 were 40,985 bushels of wheat, 205,968 of Indian corn, 56,216 of oats, 17,282 lbs. of tobacco, 27,100 of wool, 124,631 of butter, 4,040 of flax, 43,692 of maple sugar, and 13,978 gallons of sorghum molasses. There were 2,251 horses, 2,874 milch cows, 7,448 other cattle, 13,113 sheep, and 7,964 swine. Capital, Lebanon. **II.** An E. county of Alabama, separated from Georgia by the Chattahoochee river, and drained by several tributaries of that stream; area, about 550 sq. m.; pop. in 1870, 21,636, of whom 15,690 were colored. The surface is undulating. The county contains productive tracts, sandy ridges, and barren plains. It is traversed by the Mobile and Girard railroad. The chief productions in 1870 were 272,221 bushels of Indian corn, 26,770 of oats, 52,146 of sweet potatoes, and 20,796 bales of cotton. There were 824 horses, 2,410 mules and asses, 2,672 milch cows, 4,929 other cattle, and 6,540 swine. Capital, Seale's Station. **III.** A S. county of Kentucky, intersected by Cumberland river and drained by its branches; area, about 225 sq. m.; pop. in 1870, 5,809, of whom 293 were colored. It has a hilly surface and a soil fertile near the streams. The chief productions in 1870 were 13,027 bushels of wheat, 224,262 of Indian corn, 43,431 of oats, 89,484 lbs. of tobacco, 15,189 of wool, 66,416 of butter, and 17,446 gallons of sorghum molasses. There were 1,499 horses, 3,709 cattle, 7,171 sheep, and 10,679 swine. Capital, Jamestown. **IV.** A W. central county of Kansas, intersected by the Saline and Smoky Hill rivers; area, 900 sq. m.; pop. in 1870, 156. It is traversed by the Kansas Pacific railroad. The surface is generally level and the soil good. Capital, Russell.

RUSSELL, an E. county of Ontario, Canada, bounded N. by the Ottawa river; area, 686 sq. m.; pop. in 1871, 18,344, of whom 7,745 were of Irish, 5,600 of French, 2,870 of Scotch, and 1,551 of English origin. It is drained by the Petite Nation river. Capital, L'Orignal.

RUSSELL, Benjamin, an American journalist, born in Boston, Mass., Sept. 13, 1761, died there, Jan. 4, 1845. He was apprenticed at 14 years of age to Isaiah Thomas at Worcester, Mass., but before completing his term enlisted in the revolutionary army. He settled in Boston, and in March, 1784, established the "Columbian Centinel," a semi-weekly newspaper, which under his control was for 40 years an influential organ of the federal party.

RUSSELL, Charles William. See supplement.

RUSSELL, John, earl, an English statesman, third son of the sixth duke of Bedford, born in London, Aug. 18, 1792, died May 28, 1878. He was educated at the university of Edinburgh, and travelled in Spain and Portugal in 1809, the English being then shut out from most of the continental countries, and witnessed some of the most important incidents of the peninsular war. In 1813 he was elected to parliament as a whig for the family borough of Tavistock, and the Liverpool-Castlereagh ministry found in him an uncompromising opponent. At the close of 1819 he began his career as a parliamentary reformer, making annual motions on the subject. In 1826, because of his advocacy of Catholic emancipation, he was defeated in the parliamentary election in the county of Huntingdon, but was chosen for Bandon in Ireland. In 1828 he carried the repeal of the test and corporation acts through parliament, and in 1829 voted for the successful Catholic emancipation act. In the Grey ministry, formed in November, 1830, Lord John was paymaster of the forces, and took the lead in the house of commons in support of the reform bill, which he introduced in March, 1831. The bill, with some changes, was carried, and Lord John was chosen member for South Devon in 1832. He went out with the Melbourne ministry in 1834; but in 1835 he returned to office, being then appointed secretary of state for the home department, which place he held till 1839, when he became secretary of state for war and the colonies. During the six years that followed Lord Melbourne's restoration to power, Lord John Russell was really the chief member of the ministry; and he vigorously carried various reform measures, though the whigs had not a constant majority in the commons, and there was a majority against them in the house of peers. He ceased to be minister on Aug. 30, 1841, when the second Peel ministry succeeded to that of Melbourne. For five years he was chief of the opposition, but in 1846, on the breaking up of the tory party, he became prime minister, holding the office of first lord of the treasury. In 1852 he was defeated on the militia question and resigned; but when the Aberdeen ministry was formed, at the close of the year, he became secretary of state for foreign affairs, which office he soon exchanged for that of lord president of the council. He left the Aberdeen ministry in January, 1855, and shortly afterward took

the office of colonial secretary in the Palmerston ministry. He was sent as British plenipotentiary to take part in the Vienna conference, which was intended to put an end to the Crimean war; but his conduct not being approved by the English public, he withdrew from the cabinet, July 16. In 1859 he was appointed secretary of state for foreign affairs. In July, 1861, he was elevated to the house of peers with the title of Earl Russell of Kingston-Russell. The unfriendly tone assumed toward the United States in the Trent affair, the short participation of England in the Mexican expedition, the interference by a note addressed to Russia in favor of Poland in 1863, and a friendly attitude toward Denmark during the Schleswig-Holstein war are among the salient features of his management of foreign affairs during this period. After the death of Lord Palmerston in 1865, Earl Russell for the second time became prime minister, with Mr. Gladstone as chancellor of the exchequer; but differences arising between the leaders of the liberal party on the subject of reform led to a vote in parliament hostile to the ministry, which resigned in June, 1866. From that time Earl Russell was an unofficial supporter of liberal measures in the house of lords. In 1869 he introduced a bill authorizing the conferring of life peerages, and in 1870 moved for a commission on the relation between the mother country and the colonies. He published a "Life of William Lord Russell" (1819); "Don Carlos, a Drama" (1822); "Essay on the History of the English Government and Constitution" (1823; new ed., 1865); "Memoirs of the Affairs of Europe from the Peace of Utrecht" (2 vols. 4to, 1824-'9; vol. i. republished as "History of the principal States of Europe, from the Peace of Utrecht," 2 vols. 8vo, 1826); "Establishment of the Turks in Europe" (1828); "Causes of the French Revolution" (1832); "Correspondence of John, fourth Duke of Bedford, with an Introduction" (3 vols. 8vo, 1842-'6); "Memorials and Correspondence of Charles James Fox" (4 vols., 1853-'7); "Life and Times of Charles James Fox" (3 vols., 1859-'66); "Memoirs, Journal, and Correspondence of Thomas Moore" (8 vols., 1852-'6); "Selections from the Speeches of Earl Russell, 1817 to 1841, and from Despatches, 1859 to 1865, with Introductions" (2 vols., 1870); "Rise and Progress of the Christian Religion in the West of Europe" (1873); and "Recollections and Suggestions, 1813-'73" (1875). He was twice married; in 1835 to Adelaide, widow of Lord Ribblesdale, and in 1841 to Lady Frances Anna Maria, daughter of the earl of Minto.

RUSSELL, John Scott, a British engineer, born in the vale of Clyde, Scotland, in 1808. He graduated at the university of Glasgow in 1824, and was employed as an engineer till 1832, when he became lecturer on natural philosophy at the university of Edinburgh. He claimed to be the discoverer of the "wave

principle" in the construction of ships, and Brunel adopted it in the Great Western and in the monster ship Great Eastern, the latter constructed under Mr. Russell's superintendence; and he read in 1857 a paper before the British association on the "Mechanical Structure of the Great Ship." After being manager of a ship-building yard in Greenock for several years, he settled in London in 1844, where he has been extensively engaged in building large steamers. His principal works include "The Modern System of Naval Architecture for Commerce and War" (London, 1864), and "Systematic and Technical Education for the English People" (1869). He has also been engaged in efforts for the improvement of the working classes.

RUSSELL, William, lord, an English statesman, second son of William, fifth earl of Bedford, born Sept. 29, 1639, beheaded July 21, 1683. He studied at Cambridge, travelled on the continent, and was elected to parliament for Tavistock in 1660, but for the next 12 years was a silent and inactive member. In 1669 he married Lady Vaughan, a widow, and daughter of the earl of Southampton, first lord treasurer to Charles II. In 1673 he ranged himself with the Protestant or "country party," of which he was one of the leaders till his death, coming forward in opposition to the attempts of the king and his partisans to destroy English freedom through the aid of France. On the death of his elder brother, at the beginning of 1678, he became Lord Russell, and heir apparent to the earldom of Bedford. On March 14 of that year he seconded the motion to declare war against France, and spoke in support of it. In November he was chosen to move in the house of commons that the duke of York should be removed from the king's presence and councils. He was one of the chief actors in the impeachment of the lord treasurer Danby, but afterward admitted that he was mistaken in the part he took against that statesman. When the new council proposed by Sir William Temple was formed, Lord Russell was appointed one of the 30 members. He was not at first in favor of excluding the duke of York from the succession, but finally supported the measure. He left the council at the beginning of 1680. On Oct. 26 he spoke in favor of measures against "popery, and to prevent a popish successor" to the crown; and a week later he seconded Col. Titus's motion to disable the duke of York from becoming king of England. His influence in the house of commons was one of the causes of the passage of the exclusion bill through that body; but it was thrown out by the peers. When the reaction against the whigs took place, the government of Charles II. resolved to destroy their leaders, proceeding to do so according to the forms of law. Lord Russell knew that his life was in danger, but he would not fly. He was arrested on the charge of being concerned in the Rye House plot, said to have been

formed by Rumbold and others, for an attack on the king and the duke of York. When he was taken before the council, the king told him that nobody suspected him of any design against his person, but that he had good evidence of his being in designs against his government. After the examination was over, Lord Russell was committed to the tower. From that moment he began to prepare for death, as if he were already under sentence. The trial took place at the Old Bailey, July 13, 1683. The charge was "for conspiring the death of the king, and consulting and agreeing to stir up insurrection; and to that end to seize the guards [appointed] for the preservation of the king's person." The case for the government was conducted by Sir Robert Sawyer, attorney general, Heneage Finch, solicitor general, and Jeffreys. No counsel was then allowed to the accused, except on points of law, but Lady Russell was permitted to assist her husband in writing, "to help his memory." The jury was formed in violation of law, and it is certain that he was not guilty of the crime of which he was accused according to a proper construction of the act of 25 Edward III.; so that the act of 1 William and Mary, reversing his attainder, declared that he "was, by undue and illegal return of jurors, having been refused his lawful challenge to the said jurors for want of freehold, and by partial and unjust constructions of law, wrongfully convicted, attainted, and executed for high treason." The extent of Lord Russell's error was, that he had engaged in "some discourses about making some stirs," such as were common enough with the whigs after it had become evident that the king had resolved to govern contrary to law; this was all that was sworn against him, and this was not treason. Lord Russell made a short but strong speech to the court and jury; but the former charged against him, and the latter found him guilty. When brought up to receive sentence, on July 14, Lord Russell pointed out that judgment ought not to pass upon him for conspiring the death of the king, of which there was no proof by any one witness, all the witnesses having sworn a conspiracy to levy war, but no intention of killing the king. He was answered that it was an exception proper to be made before the verdict, but that the court was now bound by the verdict, as well as the prisoner; and sentence of death was passed upon him. Great efforts were made to save his life, but the king seems to have been impressed with the belief that he could not with safety to his own life spare that of Lord Russell. To please his friends, and because of his wife's distress, Russell petitioned the king and the duke of York to spare him, on condition of his living abroad, and taking no part in English affairs; but he never supposed his petition would be favorably received. He was attended by Burnet and Tillotson, but could not be brought to subscribe to their servile doctrine on the right

of resistance to tyranny. Some of his observations during the few days that passed between his sentence and execution show much pleasant humor, and others great depth of thought and eloquence. He refused to accept of a plan formed for his escape. At the scaffold he gave a paper to the sheriff that embodied his sentiments. His fellow victim, Algernon Sidney, was executed before the close of the year. Russell's attainder was reversed immediately after the revolution, and his father was created duke of Bedford in 1694, the patent stating, among the reasons for conferring the honor, "that this was not the least, that he was the father to Lord Russell, the ornament of his age," &c.—His wife, Lady Rachel Russell, survived him 40 years, dying Sept. 29, 1723, at the age of 87. Her "Letters," edited by Miss Berry, were published in 1819. A more perfect edition, edited by Lord John Russell, appeared in 1854, who has also written "The Life of William Lord Russell, with some Account of the Times in which he lived" (2 vols. 8vo, London, 1819).

RUSSELL, William, a Scottish historian, born in Selkirkshire in 1741, died in Dumfriesshire, Dec. 25, 1793. He was apprenticed for five years to a bookseller and printer of Edinburgh, and on the completion of his term published a "Select Collection of Modern Poems." In 1767 he went to London, where he was employed as corrector of the press for Strachan the publisher. From 1787 he lived on a farm in Dumfriesshire. His principal works are: "History of America" (2 vols. 4to, 1779; new ed., with additions by Charles Coote, 1815); "History of Modern Europe" (4 vols. 8vo, 1779-'84; 5 vols., 1786), continued by Coote and others in various editions to 1856 (4 vols., 1857; and "History of Ancient Europe, with a View of the Revolutions in Asia and Africa" (2 vols. 8vo, 1793; new ed. by Coote, 1815). He left an unfinished "History of England from the beginning of the Reign of George III."

RUSSELL, William Howard, a British journalist, born at Lily Vale, county Dublin, Ireland, March 28, 1821. While a student at Trinity college, Dublin, he was employed to report Irish elections for the London "Times." In 1842 he went to London, and in 1843-'5 was engaged as one of the chief reporters for the "Times." He entered the Middle Temple in 1846, and was called to the bar in 1850, but renewed his connection with the "Times." In 1854-'5 he corresponded with that journal from the Crimea, and witnessed and reported all the important engagements. In 1857-'8 he was in India to report the progress of the mutiny and revolt. He shortly after established the "Army and Navy Gazette," of which he is still (1875) editor and principal proprietor. In 1861-'2 he was in the United States as a war correspondent of the "Times," and travelled in Canada. In 1865 he was in the unsuccessful expedition of the Great Eastern to lay an Atlantic cable. In the Austro-Prussian

war of 1866 he wrote letters to the "Times" from the Austrian headquarters, and during the Franco-German war of 1870-'71 from the headquarters of the crown prince of Prussia. He has published a "History of the Crimean War" (2 vols. 12mo, 1855-'6; enlarged ed., 1857); "Rifle Clubs and Volunteer Corps" (1859); "My Diary in India" (2 vols. 8vo, 1860); "My Diary North and South" (2 vols. 8vo, 1862); "Memorials of the Marriage of the Prince of Wales" (fol., 1864); "Review of Todleben's History of the Defence of Sebastopol" (8vo, 1864); "Canada, its Defences, Condition, and Resources" (1865); "The Great Eastern and the Atlantic Cable" (1865); "Adventures of Dr. Brady," a novel (3 vols., 1868); "Diary in the East: Tour of the Prince and Princess of Wales" (1869); "My Diary during the last Great War" (1873); and some minor works collected from his contributions to periodicals.

RUSSIA (*Russ. Rossiya*), the largest connected empire of the world, extending, in Europe and Asia, from lat. 38° 20' to about 77° 30' N., and from lon. 17° 38' E. to about 170° W. It is bounded N. by the Arctic ocean, E. by the Pacific, S. by the Chinese empire, Independent Turkistan, Persia, Asiatic Turkey, and the Black sea, and S. W. and W. by Roumania, Austria, Prussia, the Baltic sea, and Sweden. Its greatest length from W. to E. is about 6,000 m.; its greatest breadth (exclusive of islands) about 2,300 m. Its total surface is estimated to comprise one twenty-sixth of the entire surface of the globe, and to represent one sixth of its firm land. The natural geographical advantages of Russia are very great. The first trade with England began at the port of Archangel on the White sea. Now the maritime trade of the empire has its chief emporiums on the Baltic, the Black and Caspian seas, and the inlets of the northern Pacific. The N. coast is deeply penetrated by large arms of the Arctic ocean, forming gulfs, of which those of Obi and Kara, on the border of Europe and Asia, and on the N. W. the White sea, are the most important.—The rivers of Russia are numerous and remarkable for their magnitude. Those of European Russia (to which alone we mainly restrict the descriptive portions of this article, referring the reader for Asiatic Russia to the articles CAUCASUS, SIBERIA, and TURKISTAN) belong to the four great basins of the Arctic ocean, the Baltic, the Black sea, and the Caspian sea. The great watershed is formed by a broad central ridge, commencing on the frontiers of Poland, stretching across the empire in an irregular waving line, and terminating on the W. side of the Ural mountains. The waters N. of this shed fall into the Arctic ocean and the Baltic sea, those S. of it into the Black or the Caspian. The Arctic ocean receives directly the Petchora, which rises in the Ural mountains, traverses the most deserted parts of Russia, receives several tributaries, and discharges by a wide estuary, remarkable

for the number of its islands. Through the White sea, the Arctic ocean receives the Mezen, the Dwina, and the Onega. On the declivity of the Baltic are the Tornea and the Kemi, which fall into the gulf of Bothnia; the Neva and the Narva, which fall into the gulf of Finland; the Düna and the Aa, which flow into the gulf of Riga; and the Niemen, which rises in the government of Minsk, and before terminating its course enters Prussia under the name of the Memel. The Vistula, whose source and mouth belong to Austria and Prussia respectively, traverses Poland, and receives several tributaries, among which the Bug, rising in Galicia, Austria, is most important. To the basin of the Black sea belong the Pruth and the Dniester, both rising in Galicia; the Bog, rising in Podolia; the Dnieper, which rises in the government of Smolensk, receives a considerable number of affluents, among them the Beresina, and falls into the Black sea near Kherson; the Don, originating in the government of Tula, intersecting the Cossack country, and discharging into the sea of Azov; and the Kuban, which descends from the Caucasus, forms part of the boundary between Asia and Europe, and near its mouth separates into two branches, one of which falls into the sea of Azov and the other into the Black sea. The basin of the Caspian sea receives the Volga, the largest river of Europe, which rises in the government of Tver and discharges into the Caspian near Astrakhan, and the Ural, which descends from the eastern declivity of the mountains, traces out for some distance the frontier of Europe, and falls into the Caspian near Guriev. Most of the lakes of European Russia belong to the northern basins, as Lake Ladoga, the largest lake of Europe, and Lakes Onega, Peipus, and Ilmen. The government of Olonetz alone contains hundreds of small lakes, and a still larger number is found in Finland.—European Russia in general forms part of an immense plain, beginning in Holland, and extending over the north of Germany and the whole east of Europe. Only occasionally small table lands occur, as the Valdai hills in the governments of Novgorod and Tver, the loftiest summit of which is about 1,150 ft. high. To the northwest some branches of the Scandinavian mountains enter the Russian territory. In the southwest the Carpathian mountains send forth slight ramifications. To the south, in the peninsula of the Crimea, is the insulated chain of the Yaila mountains, which in one place attain an elevation of about 5,000 ft. To the east the Ural mountains, and to the southeast the Caucasus, form in great part the natural frontier between Europe and Asia. The plains are here and there covered with swamps, more frequently with forests; while in the southern parts of the empire they consist of dry and woodless tracts called steppes. The steppe region extends from the river Pruth, across the lower watercourses of the Dniester,

Bog, Dnieper, and Don, as far as the Volga and Caspian sea. It is only in the western and middle parts of this region that rich meadow land is met with; the rest is poorly watered, thinly populated, and, notwithstanding the occasional fertility of the soil, but little favorable to agriculture. What the steppes are to the south and east of Russia, the *tundras* in the governments of Olonetz and Archangel, mostly toward the shores of the Arctic ocean, are to the north. They are treeless wastes, bearing a scanty vegetation of low shrubs on a moss or turf surface.—The geological structure of European Russia is characterized by vastness and simplicity. Single formations are found to extend over entire provinces. In the northern part the granite and the Permian formation, composed of grits, marls, conglomerates, and limestones, prevail; Esthonia and Ingria (government of St. Petersburg) present the Silurian formation, resting on schistose rocks. Along the chain of the Ural mountains, besides the eruptive formations of the most ancient period, the Silurian group prevails. Lithuania and Poland belong almost wholly to the tertiary group; they also contain cretaceous rocks. The southern portion of European Russia belongs to the tertiary and granitic groups. The southern coast of the Crimea is of Jurassic formation. In the Caucasian countries cretaceous and Jurassic rocks prevail, mixed with granite.—The quality of the soil differs very greatly in the different provinces. Some consist mostly of sandy barren plains or vast morasses. The most valuable portion of the empire is that south of the Valdai hills and of Moscow, extending on the east to the Volga, and including the country of the Don almost as far as the sea of Azov, and on the west to the frontier of Galicia. All this region is rich wheat land, exporting wheat to Asia and Europe, through Odessa, Nikolayev, Taganrog, and Kertch.—Almost the whole of European and three fourths of Asiatic Russia lie within the temperate zone. The southern border of the empire approaches to within 15° of the tropic zone, while the northern border extends 11° beyond the arctic circle. In general the climate is severe. The mean temperature of winter passes the freezing point even in the most southern districts. South of lat. 58° the mean temperature is between 40° and 55° F.; the winters are long and severe, and the summers short and hot. With lat. 58° the cold region begins, and with lat. 65° the arctic region. At St. Petersburg, which is within the former space, the thermometer in December and January sinks to 20° or 30° below zero, and exceptionally much lower, while in the summer it rises to 85° or 90°. Among the most common atmospheric phenomena, in the steppes as well as in the northern provinces and in Siberia, is the *buran*, a vehement wind accompanied by heavy falls of snow. The central part is also subject to violent snow

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Longitude East from Washington

87

92

97

102

107

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122

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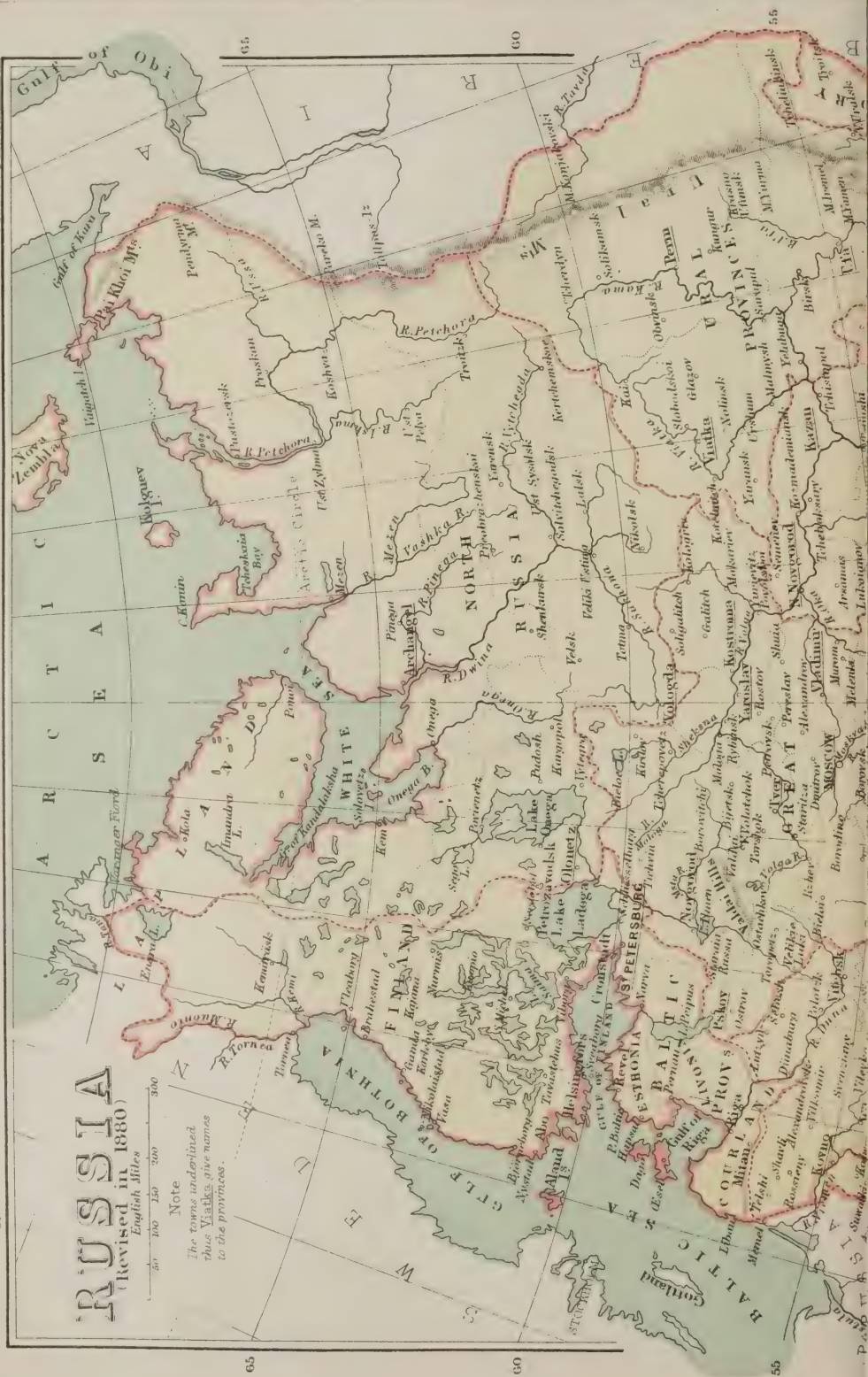
RUSSIA

(Revised in 1880)
English Names

Note

The towns underlined
thus Viakhs give names
to the provinces.

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storms, called *viuga*. In general, the climate is healthy.—The official census in Russia is taken once in nine years, and the last was in 1867. More recent estimates of the population of portions of the Russian possessions have been made for 1870, 1871, and 1872, and printed in the St. Petersburg "Calendar" (1875) and other publications. The following tables of areas and population are from Behm and Wagner's *Bevölkerung der Erde*, annexed to Petermann's *Geographische Mittheilungen* for 1875. The areas are Strelbitzki's recent calculations approved by the government and dated 1875. They include the newly acquired Transcaspian province and the Amoo Darya district organized in 1874, with the areas and population of that year. The populations here given in Russia proper, Poland, Siberia, and Central Asia are for 1870; in the Caucasus for 1871; and in Finland for 1872. The Russian empire is divided into governments (and a few divisions differently designated), the area (including inland waters) and population of each of which are estimated as follows:

GOVERNMENTS.	Area in sq. m.	Population.
RUSSIA PROPER.		
1. Archangel.....	881,508	281,112
2. Astrakhan.....	86,668	601,514
3. Bessarabia.....	14,046	1,078,932
4. Courland.....	10,537	619,154
5. Don Cossack territory.....	61,911	1,086,264
6. Esthonia.....	7,518	323,961
7. Grodno.....	14,965	1,003,521
8. Kaluga.....	11,938	996,252
9. Kazan.....	24,600	1,704,624
10. Kharkov.....	21,040	1,698,015
11. Kherson.....	27,522	1,596,809
12. Kiev.....	19,686	2,175,132
13. Kostroma.....	82,700	1,176,097
14. Kovno.....	15,692	1,156,041
15. Kursk.....	17,936	1,954,507
16. Livonia.....	18,158	1,000,876
17. Minsk.....	85,272	1,182,230
18. Mohilev.....	18,550	947,655
19. Moscow.....	12,557	1,772,624
20. Nizhegorod.....	19,795	1,271,564
21. Novgorod.....	47,234	1,011,445
22. Olonetz.....	57,436	296,302
23. Orel.....	18,040	1,598,881
24. Orenburg.....	78,885	900,547
25. Penza.....	14,996	1,173,156
26. Perm.....	128,246	2,198,666
27. Podolia.....	16,222	1,938,188
28. Poltava.....	19,264	2,102,614
29. Pskov.....	17,063	775,701
30. Riazan.....	16,253	1,477,433
31. St. Petersburg.....	20,760	1,525,471
32. Samara.....	60,197	1,837,081
33. Saratov.....	82,622	1,751,268
34. Simbirsk.....	19,103	1,208,881
35. Smolensk.....	21,637	1,140,015
36. Tambov.....	25,688	2,150,971
37. Taurida.....	24,537	704,997
38. Tchernigov.....	20,231	1,659,600
39. Tula.....	11,955	1,167,875
40. Tver.....	25,228	1,528,881
41. Ufa.....	47,031	1,364,925
42. Viatka.....	59,114	2,406,024
43. Vitebsk.....	17,438	888,727
44. Vladimir.....	18,562	1,259,923
45. Volhynia.....	27,738	1,704,015
46. Vologda.....	155,498	1,008,089
47. Voronezh.....	25,437	2,152,696
48. Wilna.....	16,411	1,001,909
49. Yaroslav.....	13,750	1,000,743
50. Yekaterinoslav.....	26,146	1,352,300
Total Russia proper (including inland waters).....	1,881,216	65,704,559

GOVERNMENTS.	Area in sq. m.	Population.
POLAND.		
1. Kalisz.....	4,392	669,261
2. Kielce.....	3,897	618,730
3. Lomza.....	4,667	489,699
4. Lublin.....	6,501	707,098
5. Piotrków.....	4,729	682,495
6. Plock.....	4,200	471,988
7. Radom.....	4,769	532,466
8. Siedlce.....	5,534	504,606
9. Suwalki.....	4,546	524,489
10. Warsaw.....	5,622	925,639
Total Poland.....	49,157	6,026,421
Total Russia in Europe with Poland.....	1,944,615	71,780,980
FINLAND.		
1. Abo-Björneborg.....	9,392	806,331
2. Kuopio.....	16,498	226,180
3. Nyland.....	4,584	173,141
4. St. Michael.....	8,819	159,348
5. Tavastehus.....	8,324	193,477
6. Uleaborg.....	63,955	185,590
7. Vasa.....	16,146	810,937
8. Viborg.....	16,611	276,884
Total Finland.....	144,269	1,882,138
THE CAUCASUS.		
1. Stavropol.....	26,634	437,118
2. Kuban.....	37,169	672,224
3. Terek.....	23,268	485,237
4. Daghestan.....	11,520	448,299
5. Zakatal.....	1,620	56,802
6. Tiflis.....	15,614	606,584
7. Baku.....	15,151	518,560
8. Elisabethopol.....	17,117	529,412
9. Erivan.....	10,668	452,001
10. Kutais.....	7,995	605,691
11. Sukhum.....	3,332	70,701
12. Tchernomorie.....	2,749	15,703
Total Caucasus.....	172,837	4,898,332
SIBERIA.		
1. Littoral province (Pacific).....	731,917	45,000
2. Amoor.....	173,554	44,400
3. Transbaikal.....	240,772	420,780
4. Irkutsk.....	809,180	878,244
5. Yakutsk.....	1,517,077	231,977
6. Yeniseisk.....	992,888	372,862
7. Tomsk.....	829,027	888,756
8. Tobolsk.....	581,964	1,066,848
Total Siberia.....	4,826,329	8,428,867
CENTRAL ASIA.		
<i>Kirghiz Territories.</i>		
1. Akmolinsk.....	210,558	881,900
2. Semipalatinsk.....	188,298	610,163
3. Turgai.....	202,186	289,980
4. Uralsk.....	141,469	846,715
5. Transcaspian province.....	126,382	275,000
<i>Turkistan.</i>		
1. Semirietchensk.....	155,292	543,094
2. Kulja.....	27,496	114,837
3. Sir Darya.....	165,998	648,489
4. Zerashan.....	19,665	271,000
5. Amoo Darya.....	39,957	220,000
Total Central Asia.....	1,277,196	8,800,628
RECAPITULATION.		
Russia in Europe.....	1,881,216	65,704,559
Poland, Kingdom of.....	49,157	6,026,421
Finland, Grand Duchy of.....	144,269	1,882,138
The Caucasus.....	172,837	4,898,332
Siberia.....	4,826,329	8,428,867
Central Asia.....	1,277,196	8,800,628
Grand total.....	8,351,004	85,685,945

Russia proper is divided by geographers into Great Russia, embracing the central and northern governments (the latter also designated

North Russia) from Kursk and Voronezh to Archangel, and including what was formerly known as Muscovy, from its centre Moscow; Little Russia, or Ukraine (Kiev, Tchernigov, Poltava, and Kharkov); South Russia or New Russia, comprising Bessarabia, Kherson, Taurida, Yekaterinoslav, and the territory of the Don Cossacks; West Russia, comprising Lithuania, Volhynia, Podolia (part of Red Russia, the bulk of which is in Galicia), Vitebsk and Mohilev (White Russia), and Minsk (Black Russia); the Baltic provinces, comprising Courland, Livonia, Esthonia, and St. Petersburg (Ingria); the Volga provinces; and the Ural provinces. The census of Russia for 1722 gave 14,000,000 inhabitants; that of 1815, 45,000,000; that of 1835, 55,000,000; and that of 1851, 65,200,000. But the data of the censuses of former times were very imperfect, and conquests have greatly swollen the total of nearly every census since 1722. For the years 1860 to 1865 the number of births was on an average a little above 3,000,000 a year, the number of deaths about 2,000,000, and the average yearly increase of the population was estimated at $1\frac{1}{2}$ per cent. The number of illegitimate births is given at 90,000 a year, and the excess of females over males in the population is estimated at 750,000. In European Russia the average density is about 35 inhabitants to the square mile; in Asiatic Russia the average does not reach 2 to the square mile. St. Petersburg and Moscow, the present and former capitals of the empire (the latter, however, still ranking as capital for some purposes), have respectively 667,026 (1869) and 611,970 (1871) inhabitants. Only four other cities have more than 100,000, viz.: Warsaw, 279,502 (1873); Odessa, 162,814 (1873); Kishenev, 103,998 (1867); and Riga, 102,043 (1867). Of the other cities and towns, 8 number from 50,000 to 100,000.—Although many portions of the empire in point of productiveness compare favorably with the most fruitful countries in Europe, agriculture is generally still at a low stage; the government and proprietors of large estates, however, have of late done much to improve it, and agricultural machines are largely imported from the United States. The wealth of the landed proprietor formerly consisted less in the extent of his land than in the number of serfs attached to it. The best cultivated land is to be found in the southern portion of the Baltic provinces, in the governments near Moscow, and in Poland; but even in these most favored provinces there are many uncultivated tracts of land. According to Lengenfeldt (*Russland im neunzehnten Jahrhundert*, Berlin, 1875), in European Russia, 20·3 per cent. of the entire surface is arable land, 11·8 meadows, 40·5 forests, and 27·4 pastures and uncultivated land. The arable land amounts to 20·9 per cent. in Russia proper, 50 in Poland, and only 1·2 in Finland. The forests cover 40·3 per cent. in Russia proper, 25·20 in Poland, and 53·3 in Finland. The forests for-

merly constituted an inexhaustible source of riches, but from reckless administration they now produce comparatively little. The old three-field system of husbandry, by which one third of the land is always in fallow, is still in general use; and in Great and Little Russia, owing to the depth of the soil, no manure is necessary. All the cereals are produced in such abundance as to leave a large surplus for export. Maize is chiefly grown in the countries about the Black sea; flax, hemp, and hops are of excellent quality; the potato is grown in all parts of the empire. The cultivation of the beet root has been greatly advanced, and a large number of sugar houses are already supplied by it. The culture of the vine in the Crimea, Bessarabia, and other southern provinces furnishes an average of 54,000,000 gallons, valued at 11,610,000 rubles. Tobacco is grown on the Volga, in Little Russia, and on the Don, and yields annually about 70,000,000 lbs., of which about five sixths belongs to Bessarabia, Poltava, Tchernigov, and Samara. Horticulture, except in the vicinity of the great cities, is neglected. Of late many agricultural societies have been formed, and a number of schools established.—Horses are very numerous in Russia, and highly valued. In the S. W. provinces the breed is particularly fine. In general the horses of Russia are hardy and strong, but not so well taken care of as in other countries. The best studs are in the governments of Tambov, Kharkov, Voronezh, and Kiev. Russia sells a large number of horses annually to Austria and Prussia. The breeding of sheep is very extensive; the wool of the common Russian sheep is hard and coarse, but of late years the breeding of fine-wooled sheep has been steadily on the increase, especially in the Baltic provinces, in Poland, and in the southern governments. Hogs are most abundant in Great Russia, Lithuania, and throughout the western provinces. The number of domestic animals in 1874, according to the reports of the statistical central committee of St. Petersburg, was about 20,000,000 horses, 28,500,000 horned cattle, 64,500,000 sheep, and 11,000,000 swine. Of the sheep about 14,000,000 were of the fine-wooled sort, principally found in the governments of Yekaterinoslav, Kherson, and Bessarabia (about 7,000,000). Bee culture is most extensive in Poland, the Lithuanian governments, and those on the Volga, especially Nizhegorod, Kazan, and Simbirsk; altogether it yields annually about 7,000,000 lbs. of wax and 21,000,000 lbs. of honey, and leaves considerable surplus for exportation. The culture of silkworms was introduced by Peter the Great, and was especially developed in the government of Astrakhan and in the southern part of the Crimea. Since 1864 it has greatly suffered by a disease among the silkworms. The southern provinces yield an annual average of nearly 20,000 lbs.; in Transcaucasia silk to the amount of about 4,000,000

rubles has been produced annually. Reindeer are kept N. of lat. 66°, and camels in the south, many being found near Orenburg. Among the wild animals are the aurochs (in the forest of Bialovitz in Lithuania), elks, deer, bears, wild hogs, gluttons, wolves, foxes, and saiga antelopes. Furs are an important article of export. Fish is very abundant in the Polar sea and in the rivers, and some tribes, especially in the northeast, live entirely by fishing. The most important fisheries are those of the Volga, the Ural, and the sea of Azov.—Nearly all the metals are found in Russia, most of them of excellent quality. The principal mines are in the Ural and Altai mountains, and near Neretchinsk in Siberia. The produce of gold increased from 18,900 lbs. avoirdupois in 1839 to 49,800 in 1845, and 65,700 in 1847, since which it has again decreased, being 61,700 lbs. in 1869. Silver is also found in the Ural and Altai mountains; the produce in 1869 amounted to 39,300 lbs. Platinum is found almost exclusively in the neighborhood of Yekaterinburg. It was first discovered in 1823; in 1861 the produce was 8,060 lbs. Copper is found in the Ural, but much more copiously (though as yet but little worked) in E. Siberia. The produce was 3,555 tons (of 2,240 lbs.) in 1852, 5,441 in 1857, and 4,310 in 1868. The iron mines furnish more than enough for the wants of the empire. The works in the Ural mountains alone are said to employ above 50,000 laborers. The total produce was 167,214 tons in 1852, 205,822 in 1857, and 319,000 in 1868. Rich coal mines have been discovered in nearly all the southern provinces of the empire, and the annual produce is rapidly increasing, amounting in 1868 to 402,300 tons. The country is very rich in salt and brine springs, the most important of which are in the government of Taurida, which alone furnishes annually about 250,000 tons, while the total produce in 1868 was 538,800 tons.—Manufactures are increasing with wonderful rapidity. Their introduction into Russia began in the 15th century, but very little was done until the time of Peter the Great. Catharine II., Alexander I., Nicholas I., and Alexander II. have all distinguished themselves by zeal in encouraging manufactures. At the death of Peter the Great there were 21 large imperial manufactories, and several smaller ones; in 1820 their number had risen to 3,724, in 1837 to 6,450, in 1845 to 7,315, and in 1854 to 18,100. Later statements vary widely. According to Sarauw (*Das Russische Reich in seiner finanziellen und ökonomischen Entwicklung*, &c., Leipsic, 1873) and Lengenfeldt, the total number of factories in 1866, inclusive of distilleries and breweries, large and small, was 84,944, which employed 919,025 workmen, and the value of their products was 650,000,000 rubles. The chief seat of manufactures is Moscow, and next the governments of Vladimir, Nizhegorod, and Saratov, and St. Petersburg and Poland. Among

the most important products are woollen goods, silk, cotton, linen of all kinds, leather, tallow, candles, soap, and metallic wares. Cotton spinning is developing rapidly; in 1870 about 122,000,000 lbs. of raw cotton were imported, while 106 spinning mills yielded about 8,000,000 lbs. of yarn, not sufficient, however, for the domestic looms, which in 1,508 manufactories produced about 220,000,000 rubles worth of cotton goods. The manufacture of woollen goods is likewise rapidly gaining. In 1866, 1,831 manufactories employed 105,135 workmen, and produced goods valued at 63,000,000 rubles. The manufacture of mixed woollen goods began in 1840, and in 1845 Moscow alone had 22 establishments; the number of manufactories in 1870 was 33, and the aggregate value of the goods produced was 1,500,000 rubles. The chief seat of the silk manufacture is the government of Moscow; altogether there are 518 establishments, employing 12,000 workmen. The number of beet-sugar manufactories in 1871 was 325, which employed 70,000 persons; the produce was valued at 30,000,000 rubles.—The seaports are few, being almost confined to Archangel on the White sea, St. Petersburg and Riga on the gulfs of the Baltic, Odessa, Nikolayev, and a few others on the Black sea, Taganrog on the sea of Azov, Astrakhan, Baku, and Kizliar on or near the Caspian, and Nikolayevsk at the mouth of the Amoor. The principal articles of the foreign commerce for 1871-'2 were:

EXPORTS.	Rubles.	IMPORTS.	Rubles.
Cereals.....	184,600,000	Raw cotton....	46,900,000
Flax.....	87,900,000	Hardware.....	20,400,000
Flax seed.....	22,300,000	Machines.....	29,500,000
Wool.....	14,500,000	Tea.....	85,200,000
Tallow.....	2,900,000	Raw metals....	24,600,000
Timber.....	22,400,000	Dyestuffs.....	14,900,000
Hemp.....	11,900,000	Oil.....	12,600,000
Hogs' bristles..	5,700,000	Liquors.....	14,800,000
Cattle.....	10,200,000	Wool.....	15,200,000
Tow.....	2,800,000	Fruit.....	11,800,000
Hides.....	3,300,000	Woollen goods..	14,200,000
Cordage.....	1,500,000	Cotton yarn....	12,600,000
Furs.....	3,200,000	Tobacco.....	9,900,000
		Raw silk.....	6,500,000
		Silk goods.....	7,100,000

The value of Russian commerce for 1872 was:

EUROPEAN AND AMERICAN TRADE.	Imports, rubles.	Exports, rubles.
Germany.....	171,828,000	77,319,000.
Great Britain.....	120,067,000	143,806,000
France.....	18,890,000	22,331,000
Austro-Hungarian monarchy.....	23,786,000	19,559,000
Turkey.....	15,709,000	6,025,000
Belgium.....	5,251,000	6,907,000
Netherlands.....	5,388,000	7,487,000
Italy.....	12,773,000	8,980,000
Spain.....	1,548,000	109,000
Sweden and Norway.....	4,423,000	5,442,000
Denmark.....	404,000	6,502,000
Greece.....	2,411,000	1,235,000
Roumania.....	4,092,000	2,565,000
Portugal.....	485,000	570,000
United States.....	12,295,000	1,078,000
Other countries.....	12,582,000	1,582,000
Total.....	414,678,000	811,553,000

ASIATIC TRADE.	Imports, rubles.	Exports, rubles.
Turkey	6,275,000	8,552,000
China	8,015,000	2,825,000
Persia	4,925,000	1,693,000
Other countries.....	20,000	1,262,000
Total	19,235,000	9,332,000

The following table gives the value of imports and exports for a series of years:

YEARS.	Imports, rubles.	Exports, rubles.
1880	181,353,251	159,303,405
1885	209,247,777	164,305,010
1893	323,451,000	428,959,000
1870	342,853,000	318,510,000
1871	360,367,284	352,578,686
1872	242,320,000	272,870,000

In 1872 the imports of gold and silver, in coin and bars, amounted to 12,968,000 rubles, and the exports to 5,742,000. The movements of shipping in 1871 and 1872 were as follows:

YEARS.	ENTERED.		CLEARED.	
	Vessels.	Tonnage.	Vessels.	Tonnage.
1871.....	12,256	1,894,830	12,172	1,897,633
1872... ..	10,071	1,577,489	10,044	1,579,204

The Russian commercial fleet in 1874 comprised 2,504 vessels (of which 227 were steamers), of 520,584 tons. The inland trade is carried on in a very great measure by means of annual fairs, of which those at Nizhni Novgorod are the most remarkable.—The first railway in Russia was completed in 1836, and extends from St. Petersburg to Tzarskoye Selo and Pavlovsk, two imperial residences, the latter distant from the capital 17 m. A much more important road, from St. Petersburg to Moscow, was opened in 1851, and is 398 m. long. In 1874 the total length of the Russian railways was 10,725 m., with about 2,400 m. in course of construction. The aggregate capital expended in the construction of railways up to January, 1874, was 1,403,900,000 rubles. The interest guaranteed by the state amounted in 1873 to 51,180,000 rubles, of which 14,590,000 had really to be paid. The entire receipts of the railways in 1873 amounted to 122,880,000 rubles. The first electric telegraph was constructed in 1853, since which time the lines have been rapidly extended throughout the empire, including one across Siberia. The aggregate length of the lines at the close of 1872 was 44,692 m., and of telegraph wires 90,430 m. The number of offices was 1,333, and of telegrams 3,259,552; the revenue, 17,120,000 rubles; expenses, 14,957,000 rubles. The Baltic is connected with the Black sea by the Duna, the Oginski canal, the Beresina, and the Dnieper and Bog systems, and with the Volga and the Caspian sea by the Nizhni Volotchok, Tikhvin, and Maria canals. A canal across N. Finland forms a connection be-

tween the White sea and the Baltic. Many other canals connect two rivers. The Don and the Volga are connected by a horse railroad. The communication with Siberia is greatly facilitated by natural waterways. The Kama and its affluent the Ufa lead close to the mines of the Ural.—The government of the Russian empire is an absolute monarchy. The emperor has the title of *samoderzhets* (autocrat) of all the Russias. At the same time he bears the titles of king of Poland, grand duke of Finland, czar of Kazan, Astrakhan, and Siberia, and several others, including many hereditary German ones which have come to him through the connection of the Romanoff dynasty with German princely houses. According to the law of 1797, the crown was hereditary by right of primogeniture, with a preference for the male descendants; but the emperor Nicholas changed this law, excluding female inheritance altogether so long as there is a male member of the family. All the marriages of the members of the reigning family must have the emperor's sanction, and all the children of a matrimonial alliance not recognized by the sovereign are excluded from the succession. The hereditary grand duke becomes of age at 16; all the other princes at 18. With regard to Finland, the emperor is bound by the act of incorporation of 1809 to observe certain constitutional privileges of the grand duchy; but in reality this is never done, and the kind of diet which Finland possesses is of no value to its people. The highest consultative body of the empire is the state council, which is frequently presided over by the emperor himself. It consists of the ministers and such other dignitaries as he may appoint, and is divided into three departments, legislative, administrative, and financial. The next in importance among the central boards of the empire is the senate, created in 1711 by Peter the Great. It has charge of the promulgation and execution of the law, and forms also the supreme court. The number of its members generally does not exceed 120. The third central body is the holy synod, which has jurisdiction over the affairs of the Russian state church. The synod was established in 1721, and has its seat at St. Petersburg, with a section at Moscow. The state ministry consists of ten ministers, and a department of general financial control. There is also an institution called the committee of ministers, in which all the ministers meet once a week and consult on the affairs of the state, under the presidency of a dignitary specially appointed by the emperor. The ten ministers are those of the imperial house, of foreign affairs, of war, of the navy, of the interior, of finance, of public instruction, of justice, of the imperial domain, and of public works. Poland and Finland are represented at St. Petersburg by special secretaries of state, through whom all orders issuing from the central power are transmitted. The Caucasus, Siberia, and central Asia are ruled by their respective governors

general, who have all the powers of imperial lieutenants. The division of the empire into governments is purely administrative. The officials at the head of them are called civil governors, but many of them are military men. They all have above them general governors, who are invariably military men. These general governors are not dependent on the minister of the interior, but make their reports directly to the senate and the war office, and can be appointed and dismissed only by the emperor. There are 14 military general governorships of this description, viz.: those of St. Petersburg, Finland, Wilna, Warsaw, Kiev, Odessa, Kharkov, Moscow, Kazan, the Caucasus, Orenburg, West Siberia, East Siberia, and Turkistan. The judiciary system of Russia was entirely reorganized by a ukase of 1864. The courts are divided into two classes, courts of justices of the peace, with jurisdiction of civil cases not involving more than 500 rubles, and the general courts, consisting of the district courts and the courts of appeal. The decision of a justice of the peace can be appealed from to the assembly of all the justices of a given district, the senate remaining in all cases the highest court of cassation. The trial of criminal causes by jury was introduced in 1866. —No empire of the world contains so great a variety of nations and tribes as Russia; their number exceeds 100, and they speak more than 40 different languages. The smaller and the uncivilized tribes are rapidly being amalgamated with the ruling race, the Russians; but the Poles, the Lithuanians, the German element in the Baltic provinces, the Finns, and a few minor nationalities, do not yet give any indications of losing their distinct national character. The immense majority of the population are Slavs, in two principal divisions, Russians (56,600,000) and Poles (4,800,000), to which, as a third, though much smaller division, the Serbs and Slavic Bulgarians must be added, counting together about 70,000 souls, and mostly living in settlements on the Dnieper and the Inguletz. The Russians form almost the sole population of Great and Little Russia, and also preponderate in influence, if not in number, in South and West Russia and in the Volga and Ural provinces. The Russians are again subdivided into Great and Little Russians. The latter, also called Red Russians, Ruthenians, or Russins, include a large portion of the Cossacks, and inhabit Little Russia and South Russia, and, mixed with Poles, some districts of West Russia. The Great Russians are the predominant race, and their language is used throughout the empire by the government and the majority of the nation. The common people are vigorous and hardy, accustomed to the rigors of a severe and varying climate, and the hardships entailed by oppression, a merciless conscription, and occasional famines. They are of a cheerful temper, fond of song and frolic, and addicted to excessive drinking. Though slavish,

resigned, and generally good-natured, they are not unapt to fly into passion and commit acts of revenge, and both murder and arson are frequent. Theft is very common. They are both gregarious and migratory in their habits, easily adapting themselves to changed circumstances, and are possessed of unusual mechanical skill. As soldiers they are remarkable for endurance and blind obedience rather than for personal courage. The use of vapor baths is general, though cleanliness is far from being a national virtue. Gross superstition prevails among the lower classes, and among the higher alternates with radical unbelief and subversive notions. The houses are adorned with painted images of saints, on whom various forms of adoration are lavished. The churches in the towns, consisting chiefly of frame houses, are striking by their gaudy domes and spires and lofty double crosses, which from a distance attract the eye of the traveller, and relieve the monotony of the vast plains. The mass of the Great Russians are agriculturists, mechanics, laborers in towns, or itinerant traders; the Little Russians are largely engaged in rearing cattle and horses. Among the non-Slavic nations the following are the most important: 1. The Letts have maintained themselves almost pure in the Baltic provinces, especially in Courland; while, as Lithuanians, in the governments of Wilna, Grodno, and Kovno, they have largely amalgamated with Poles. 2. The Germans are, though not a majority, the predominant race in the Baltic provinces. They also have flourishing settlements throughout southern Russia, and large numbers of German scholars, physicians and druggists, artisans, mechanics, miners, military men, &c., are found in the large cities. 3. The Finns have from the oldest times occupied the northern part of European Russia and a portion of Siberia. To them belong the Finns strictly so called and the Lapps in Finland, the Tchuds, the Vots, the Livs, and the Esths (in Courland, Livonia, Esthonia, Vitebsk, Pskov, St. Petersburg, Archangel, and Olonetz), and a number of tribes on the Volga and in the adjoining territories. (See FINNS.) 4. The Tartar race is represented by the Tartars proper in the Crimea, Transcaucasia, Astrakhan, and West Siberia; the Nogais on the Kuban and Don, and in Taurida; the Meshtcheriaks in Orenburg; the Bashkirs in Orenburg, Ufa, and Perm; the Kirghiz between the Ural and Irtysh rivers; and Yakuts in Yakutsk and Yeniseisk. 5. The Mongolian race in the wider sense, which embraces the two preceding races, is further represented by the Buriats, Tungusians, Ainos, and other tribes in East Siberia; the Calmucks in Astrakhan, the Don Cossack country, Caucasia, and Siberia; the Samoyeds and Ostiaks on both sides of the Obi; and Uzbeks, Turkomans, and Tajiks in the recently annexed territories of central Asia. 6. Among the numerous Caucasian tribes, the Circassians,

Lesghians, Georgians or Grusians, and Mingrelians are the most prominent. 7. The Persians and Armenians are represented in Transcaucasia. The Jews are most numerous in Poland and West Russia. Formerly they were not allowed to live in Great Russia, from which they had been expelled in the 11th century; and even now they are admitted there and in some other parts only under various restrictions, and nowhere in the empire do they enjoy full rights of citizenship. Greeks are especially found in Odessa and some other large cities. As to social position, the population is divided into three classes with hereditary rights, the nobles, the inhabitants of towns, and the country people. Peter the Great abolished the dignity and official privileges of the boyars (see *BOYAR*), and since then the nobility have lost their prerogatives as a caste, and the offices of the empire are accessible to all. In 1722 he established a regulation of class (*tain*), which is still in force, concerning the rank of the officers of state, dividing them into fourteen classes, the first eight of which have hereditary nobility conferred on them, while the members of the other six obtain only a personal nobility. In 1872, according to Lindheim (*Die wirtschaftlichen Verhältnisse des Russischen Reiches*, 1873), there were 591,266 noblemen of hereditary and 327,764 of personal rank. The legal relations of the inhabitants of the towns were reorganized by a ukase in June, 1870. The citizens of a town elect a magistrate or town council (*duma*), which in turn elects a committee (*uprava*) and the mayor. In smaller towns no committee is elected, but its functions are performed by the mayor. The aggregate population of the towns amounted in 1872 to 6,907,071. The bulk of the population consists of the peasants, numbering about 56,300,000. Before the act of emancipation, they were divided into three classes, viz., free peasants, peasants under the special administration of the crown, and serfs. The first class included the *odnodvortzi* or freeholders, who until 1845 formed a subdivision of the country nobility, but were transferred to the class of peasants when, by order of the emperor, the titles of nobles were examined. The second class comprised the crown peasants, holders of land by socage, some 16,000,000; the domain peasants; the peasants bestowed on nobles and merchants in some manufacturing districts, on condition that they should return to the crown in case the manufactories were closed; and the exiles in Siberia. The serfs numbered about 22,000,000, and belonged partly to the crown and partly to the nobles. Russian serfdom dates from the beginning of the 17th century, when the field laborers were gradually deprived of the right to move at will from master to master. They were attached to the soil, which they could not leave without the consent of the master; the latter, on the other hand, not having the right to dispose of the serfs with-

out the land. In the spring of 1861 an imperial manifesto, dated Feb. 19 O. S. (March 3), providing for the emancipation of the serfs, was read in all the churches of the empire. —The great majority of the inhabitants belong to the Russian church, which in doctrine entirely agrees with the other branches of the Greek church, while in administration it is distinct. Since the times of Peter the Great it has been governed by a "holy synod," which is one of the supreme boards of the empire. It is dependent on the emperor in questions of administration, but not of dogma or of rites. The bishops composing the holy synod reside partly in St. Petersburg and partly in their dioceses. The church is divided into 52 archiepiscopal dioceses or eparchies. The church in 1870 had 62 archbishops and bishops, 385 monasteries with 5,750 monks, 154 nunneries with 3,226 nuns, 1,334 arch priests, 40,852 priests, 11,852 deacons, and 70,280 clerks, who discharge the duties of readers, chanters, sacristans, beadles, and singers. The total number of churches was 33,100, including 59 cathedrals. The four ecclesiastical academies at St. Petersburg, Moscow, Kiev, and Kazan have of late been reorganized; in 1872 they numbered 106 professors and 410 students, and there were also 51 theological seminaries with 15,585 students. The lower clergy are mostly poor and ignorant, but the government of the present emperor has made better provisions for their theological education, and established a central relief fund for raising their salaries, the minimum of which was fixed in 1869 at 300 rubles. The church service is performed in the Old Slavic language, which the mass of the people do not understand at all. The liturgy contains, besides the prayers common to all the liturgies of the Greek church, special prayers for every separate member of the imperial family. Sermons were formerly a rare exception at divine service; but recently, owing to the better education of a portion of the clergy, the movement for making the sermon a part of the service is gaining ground. Every member of the Greek church is obliged to take the sacrament once a year. The established church has some special privileges, as the ringing of the larger bells, public processions, &c. None of its members are allowed to secede to another denomination, and all children born of mixed marriages are claimed for it. All foreign princesses marrying into the imperial family must likewise embrace the national religion. In other respects Catholics and Protestants enjoy equal civil rights with members of the established church, and are equally admissible to the highest offices of the empire; while unconverted Tartars are admitted to military offices. The political separation of the Russian church from the main body of the Greek church took place after the flight of the Greek patriarch from Constantinople to Moscow in the 16th century. Archbishop Isidore of Kiev and Moscow in 1439

visited the council of Florence to promote a union of the eastern churches with the Latin, but on his return was arrested and deposed. Feodor I. in 1589 appointed the first Russian patriarch, and even obtained for the new dignity in 1593 the recognition of the four oriental patriarchs. The patriarchate was again abolished by Peter I., who transferred the supreme administration to the "holy synod," reserving for himself and his successors the headship of the church. To a still higher degree was the church stripped of her independence under Catharine II., the secular government assuming all the property of the church and the education and appointment of the clergy. In point of zeal and activity the Russian church cannot compare with the Roman Catholic and the Protestant churches. A Bible society was organized under Alexander I.; it was suppressed during the reign of Nicholas, but has resumed its operations under Alexander II. A number of years ago a few members of the highest Russian aristocracy joined the Roman Catholic church; and Prince Gagarin (who entered the order of the Jesuits) maintained that there was in the Russian church a considerable party favorable to a corporate union of the church with Rome. There is also a small party which endeavors to establish closer relations with the churches of the Anglican communion and with the Old Catholics. The membership of the established church in 1871 was stated at 53,139,000 in Russia proper, 30,000 in Poland, 42,000 in Finland, 1,930,000 in Caucasia, and 2,875,000 in Siberia. In central Asia the population connected with the Greek church was estimated in 1874 at about 130,000. Thus in the whole empire the population belonging to this church is supposed to exceed 58,000,000. There is, however, a vast number of sects, some of which are recognized by the government and their statistics given (although said to be under-estimated) by the minister of public worship. Of the latter there are the Dukhobortzi, or Champions of the Holy Spirit; the Molokoni, or Milk Drinkers; the Khlysti, or Flagellants; and the Skoptzi, or Eunuchs, also called White Doves, who practise castration. These last have existed from ancient times, and have their adherents chiefly among the wealthy. Besides these, writers mention the Little Christians, Helpers, Non-Payers of Rent, Napoleonists, and others. The largest body, the existence of which the government ignores, is the Ras-kolniks, whose origin is assigned to the popular opposition to certain reforms introduced in the 17th century by the patriarch Nikon, especially to changes in the Slavic translation of the Bible and in the Slavic liturgical books. They call themselves Starovertzi or Old Believers. As their antipathy to change often extends to political measures, they have been generally persecuted by the government. Their history is but little known, and accurate statistics cannot be obtained. Their number has been

variously estimated at from 1,000,000 to 17,000,000; the best authorities incline toward the highest estimate. The United Greek church some years ago numbered about 230,000, all Ruthenians in Poland; in the spring of 1875, however, the bulk of them joined the Orthodox church. The Gregorian Armenian church has six eparchies: Nakhitchewan, Bessarabia, Astrakhan, Erivan, Gruso-Imerethia, Karabagh, and Shirvan. The most celebrated literary institution of this church is the Lazareff institute for oriental languages at Moscow, which provides for the education of 20 youths. The number of Gregorian Armenians is said to be 37,000 in European Russia, and 561,000 in the Caucasus. The Roman Catholic population is given as 2,883,000 in Russia proper, 4,326,000 in Poland, 830 in Finland, 18,000 in the Caucasus, and 25,000 in Siberia. The Protestant population, a large majority of whom are Lutherans, is 2,234,000 in Russia proper, 331,000 in Poland, 1,797,000 in Finland, 10,600 in Caucasia, and 5,700 in Siberia. The number of Mohammedans amounts to 7,225,000: 2,359,000 in European Russia, 1,960,000 in Caucasia, 61,000 in Siberia, and 2,843,000 in central Asia. The Lutheran church is divided into six consistorial districts. The general consistory has its seat at St. Petersburg. A Lutheran theological faculty is connected with the university of Dorpat. The Reformed denomination has about 30 churches, mostly in Lithuania, where they are organized into a synod. The scattered Reformed congregations in other parts of the empire are under the direction of Lutheran consistories. The Mennonites claimed in 1873 a population of nearly 40,000, chiefly in South Russia; but as the new military law abolished the exemption from military duty which had formerly been conceded to them, they resolved to emigrate to the United States. (See MENNONITES.) The Moravians have prosperous missions in Livonia and Esthonia, where they have more than 250 chapels and 60,000 members. Recently the Baptists have also established a few missions, which in 1873 resolved upon forming a Russian organization. The Jews number about 2,647,000 (1,829,000 in Russia proper, about 800,000 in Poland, and the remainder in Caucasia and Siberia). The most numerous of the pagans, whose number is estimated at about 550,000, are the Buddhists, with 380 places of worship and 4,400 priests.—The cause of public education was first effectively promoted by Peter the Great, who caused Russia to take the first step toward European civilization. Catharine II. founded many schools and literary institutions. Alexander I. made great efforts in behalf of the people, and tried to establish a complete system of public instruction. The principal departments of education, with the exception of the military schools, are under the superintendence of the ministry of public instruction, established in 1802. The empire (excepting Finland) is divided for educational purposes into

ten circles, each of which is under the superintendence of a curator, viz.: St. Petersburg, Moscow, Dorpat, Kiev, Warsaw, Kazan, Kharkov, Wilna, Odessa, and the Caucasus. There are eight universities: at St. Petersburg, Moscow, Dorpat, Kiev, Warsaw, Kazan, Kharkov, and Odessa. Finland has a university of its own at Helsingfors. Dorpat is the only one which has a theological faculty. The number of professors at the eight universities in 1873 was 545; of students, 6,697. The number of lyceums and gymnasiums was 126, of pro-gymnasiums 32; the aggregate attendance of these institutions was 42,791. According to the report of the minister of public instruction in 1872, the number of popular schools was 19,658, with 761,129 pupils, of whom 625,784 were boys and 135,345 girls. The number of special schools was 206, with 41,553 pupils. The number of learned societies in connection with the ministry of public instruction in 1873 was 32, of which 9 belonged to universities or similar institutions and 23 had an independent existence. The imperial academy of science at St. Petersburg, founded in 1723-'5, ranks high among societies of this class. Several scientific establishments belong to other departments of the state; among them are institutions dependent on the ministry of the navy, a law school, polytechnic schools, commercial academies, a considerable number of agricultural and mining schools, and navigation schools. The study of oriental languages has been cultivated of late with special zeal, and no other university of Europe has so many active professors of Asiatic languages as that of Kazan. The number of newspapers in 1868 was 219, of which 117 were published in Russian, 30 in German, and 20 in Finnish. According to official accounts, there were in 1872, in 197 towns, 360 printing establishments, 366 publishers and booksellers, and 261 circulating libraries. There are few public libraries outside of St. Petersburg, Moscow, and Warsaw; but the foundation of such institutions has been laid in many of the provincial towns, and the so-called imperial public library of St. Petersburg contains 1,100,000 volumes in all languages. The position of women in Russia, up to the time of the empress Catharine, was very much degraded. That sovereign did all in her power to raise both their intellectual and social standing. Among other measures was the establishment of a seminary for girls in St. Petersburg; the girls who entered this were not permitted to leave before seven years, when their education was considered complete. The seminary was divided into two parts, one of which belonged to the nobility and the other to the middle class; the number of girls educated therein was 500. Since that time (1764) institutions for female education have been constantly increasing all over Russia. Female gymnasiums have been established throughout the country, the number of which was given in 1873 as 200,

and that of the pupils 23,000. These institutions are all supported by special municipal tax, and have not only contributed to the education of Russian women, but also diminished the antipathies and prejudices arising from inequality of birth, social position, and fortune. The pupils are admitted to the gymnasiums without distinction of parentage, and they wear in many instances a uniform dress. Where the population is mixed, no distinction is made even in the nationality of the pupils, so that the Tartar and the Bashkir girls in the east are brought together with the Russian girls, just as the Polish are in the west. Taking into consideration the comparatively recent date at which the education of girls in Russia has been cared for, the Russian women have shown remarkable aptitude. Out of 63 female students at the university of Zürich in 1872, 54 were Russians. The question of religion is not regarded in the admission of pupils into the schools; all denominations have an equal right in this respect, and there are priests and parsons attached to the establishments to give religious instruction. Even the Jews and Mohammedans form no exception. Where the number of pupils belonging to a certain sect is not sufficient to warrant the retention of a clerical teacher, the parents are left to provide religious instruction.—The penalties of death and of corporal punishment have been almost entirely abolished in Russia. The former is pronounced now only for high treason, and no criminal court of the land can inflict it; only special high tribunals appointed for exceptional cases having that power. Corporal punishment is maintained only in Siberia as a disciplinary measure among the convicts. The criminal statistics of 1860-'68 show an average of 534,000 civil, criminal, and police cases in the whole empire; the number of persons sentenced was about 84,000, or less than 17 per cent. of the whole number brought to trial; of these, 1,211 persons were sentenced to hard labor, 2,172 to exile in Siberia, 2,488 to transportation, 6,667 to enrolment in convict companies which are kept in the fortresses for heavy manual labor, 13,669 to imprisonment, and 57,757 to smaller punishments; 31 per cent. of the whole number were cases of theft, and only 2 per cent. were cases of murder and homicide; the number of women included in the 84,000 convicts was 8,800, or a little more than 10 per cent.—The silver ruble is established by an imperial decree of 1839 as the legal and unalterable metallic unit of the money current in the empire. Its value is equal to 37½d. in English, or 73½ cts. in American money. A ruble is divided into 100 copecks. Gold pieces of 3 and 6 rubles, and a few platinum pieces of the same value, are coined; but the main medium of circulation is paper money, which stands abroad at over 15 per cent. discount. The English inch and foot are generally used throughout Russia, except in measuring timber for the export duties. The

arshin and the *sazhen* are used as measures of length. The *arshin* equals $2\frac{1}{4}$ English feet; the *sazhen*, 7 English feet. For the measurement of distances they have the *versta* (verst), equal to 3,500 feet, or a little less than two thirds of an English mile. The smallest weight is the *zolotnik* = 6 grains; 3 *zolotniks* = 1 *loth*; 32 *loths* = 1 pound (the Russian pound is the same for gold, silver, and merchandise); 40 pounds = 1 *pood*; 1 *pood* = 36 lbs. 1 oz. 10 drs. *avoirdupois*. Time continues to be reckoned in Russia by the Julian calendar; yet in business with foreign countries the Russians use both the Julian and Gregorian dates.—The finances of the empire suffered greatly from the European wars which were carried on under Alexander I.; but they were somewhat improved under the able administration of Count Kankrin. During the reign of Nicholas no reports of the condition of the finances were published; and it is only since 1862 that any publication of this kind has taken place. Now, however, the government publishes annually a budget, though both the receipts and expenditures are frequently manipulated so as to produce a more favorable impression than the truth would warrant. Subjoined is a table showing the general condition of the finances from the beginning of this century:

YEARS.	Revenue, rubles.	Expenditure, rubles.	Surplus (+) or deficit (-).
1800	65,700,000	69,100,000	+ 2,600,000
1810	64,188,000	71,245,000	- 7,057,000
1820	128,220,000	134,000,000	- 5,780,000
1830	116,245,000	118,817,000	- 2,572,000
1840	165,190,000	187,979,000	- 22,789,000
1850	224,640,000	287,186,000	- 62,546,000
1860	386,916,000	438,239,000	- 51,323,000
1861	411,584,000	418,796,000	- 2,212,000
1862	379,373,000	389,186,000	- 9,763,000
1863	418,974,000	438,998,000	- 20,024,000
1864	393,721,000	444,979,000	- 51,258,000
1865	418,897,000	432,107,000	- 13,210,000
1866	352,695,000	413,298,000	- 60,603,000
1867	419,838,000	424,904,000	- 5,066,000
1868	421,560,000	441,282,000	- 19,776,000
1869	457,496,000	468,797,000	- 11,301,000

It appears from this table that, while both the revenue and expenditures during the period from 1800 to 1869 increased more than six-fold, yet the expenditures regularly exceeded the revenue. Since 1871 both the budgets and the accounts of actual receipts and disbursements, as published by the government, bear a more favorable aspect, as is partially shown by the following table:

YEARS.	BUDGET.		ACTUAL.	
	Revenue, rubles.	Expenditure, rubles.	Revenue, rubles.	Expenditure, rubles.
1871...	470,692,000	510,618,000	508,188,000	499,735,000
1872...	497,178,000	469,400,000	527,621,291	523,783,508
1873...	517,349,000	517,322,000	.....	.....
1874...	539,851,000	536,688,000	.....	.....

The only direct tax of the empire is a poll tax (in 1874, 94,631,469 rubles) levied from the

peasantry and raised at little expense. Customs (53,068,000) of a protective nature, and the excise duties (206,068,044), mostly laid on spirits, beer, salt, and tobacco, form the bulk of the indirect taxes. The largest branches of expenditure are those for the army (170,192,553 rubles), the navy (24,847,685 rubles), and the national debt (93,257,877 rubles), the last named branch comprising interest and sinking fund. The public debt in January, 1873, was as follows:

	Rubles.
I. Funded debt	905,693,564
1. Foreign redeemable debt...	157,492,827
2. Home " "	270,348,860
3. Foreign irredeemable debt..	275,728,199
4. Home " "	202,123,688
II. Debts not entered in the great book.....	552,618,672
III. Debts of the Imperial Russian bank.....	816,769,328
Total.....	2,277,081,564

From these amounts may be deducted the sum of 412,000,000 rubles which has been advanced to railway companies, to corporations, and to towns, leaving an actual debt of about 1,864,000,000 rubles. Banking business has of late years received a considerable impulse. There are not fewer than 40 joint-stock banks in Russia, with an aggregate capital of 104,000,000 rubles. Five of these are in St. Petersburg. There are also a number of territorial (*zhemski*) banks, by means of which the government was enabled to carry through the emancipation of the peasants. The government advanced to landowners from 1861 to 1873 the sum of 628,439,844 rubles. The entire amount, with interest, is to be redeemed by the peasants, but in the mean time the state assumes the responsibility for its repayment.—The ukase of Nov. 16 (4 O. S.), 1870, announced the adoption by the Russian government of the principle of universal liability to military service, and another of Jan. 13, 1874, reorganized the entire military system. The armed forces of the empire are now to consist of a standing army and of a militia. The standing army embraces the land and naval troops. The land troops comprise: 1, the active army, which is to be kept up by annual recruitings; 2, a reserve force, formed of men whose term of service in the active army has expired; 3, the Cossacks and other regular troops of various Asiatic tribes. The militia is composed of all men from 20 to 40 years of age, capable of bearing arms, who do not belong to the standing army; a portion of this militia, containing the younger men, can in time of war be employed for filling up the irregular forces. Every Russian subject who has attained his 20th year and is not physically incapacitated is liable to service, immunity from which by purchasing a substitute is prohibited; the period of service is fixed at 15 years, six of which are to be spent in an active force, and nine in the reserve; the recruiting is done by drawing lots, and those who do not enter into the regular army have to serve in the militia. The entire empire is divided into

recruiting districts. Young men who belong to the so-called liberal professions, and have received a certain degree of education, have the duration of their service in the active army restricted to six months, 18 months, three years, or four years, according to the degree they have attained; there are also volunteer engagements of three months, six months, and two years, as in France, equally in accordance with the educational privileges of the young men. But a nine years' reserve service is obligatory upon all such men. The infantry and the cavalry of the army, now (1875) in course of reorganization, are to have for their military unit the division, composed of four regiments; the artillery, riflemen, and engineers are to be formed into brigades. Twelve regiments *d'élite* and a brigade of riflemen will still form the corps of imperial guards stationed at St. Petersburg, while the remaining 45 divisions of infantry are to be formed into 15 corps, each consisting of three divisions of infantry, one of cavalry, and a number of Cossacks, artillery, and engineers. Each division of infantry consists of two brigades, each brigade of two regiments of three battalions each, each battalion of four companies, and each company of 250 men. Each division of cavalry is to consist of two brigades, each brigade of three regiments, and each regiment of four squadrons of 250 horses. The cavalry brigade consists of a regiment of dragoons, a regiment of lancers, and a regiment of hussars. A brigade of artillery consists of six batteries of eight guns each. Of these batteries, three are of nine-inch guns, two of four-inch guns, and one of mitrailleuses. The whole regular army will thus consist of 192 regiments of infantry, 56 regiments of cavalry, and 2,256 guns, besides seven brigades of riflemen (one of the guards). The engineer corps is composed of six brigades of sappers and six half battalions of pontoniers. The Cossacks are divided into regiments of 10 *sotnias* of 100 men each; they now comprise 153 mounted regiments, with 37 battalions on foot, and 28 batteries. The number of these troops can be increased *ad libitum* at any time, as all the Cossacks are liable to life-long service. The army is now (1875) estimated at 750,000; but the whole military force of Russia in case of war can be brought to 1,500,000, with 300,000 horses, half of which is designed to be used for offensive operations, and the other half for defensive only. The Russian navy is commanded by 81 admirals and 2,990 officers of all ranks, and contains 25,500 sailors and marines. The fleet consists of 225 steam vessels, with 521 guns, of a total tonnage of 172,501 and total horse power of 31,978, distributed as follows: Baltic fleet, 27 ironclads with 200 guns, 40 steamships with 170 guns, and 70 transports; Black sea fleet, 2 ironclads with 8 guns, 25 steamships with 45 guns, and 4 transports; Caspian fleet, 11 steamships with 45 guns, and 9 transports. There are also

37 steamers with 53 guns, of a tonnage of 2,424 and a horse power of 2,250, scattered in the sea of Aral and on the Pacific and Arctic coasts. The administration of the navy is in the hands of the minister of marine, assisted by an admiralty council, but the supreme command of the fleet is vested in the grand admiral, now the grand duke Constantine, brother of the czar. The great naval stations are Cronstadt in the gulf of Finland and Sebastopol on the Black sea. The great navy yards are those of St. Petersburg at the mouth of the Neva, and Nikolayev in the Black sea.—The ancient history of Russia is involved in great obscurity. (For an account of theories concerning the name Rus in its earliest connections, see JAPHETH.) The Greek and Roman writers mention the Scythians and the Sarmatians as the inhabitants of the vast and unknown regions of the north, especially of the country between the Don and the Dnieper, a description of which is given by Herodotus. Strabo and Tacitus say that the Roxolani, a Scythian tribe, which according to the testimony of the later writer Spartianus was ruled by kings, lived on the Don. The Greeks entered into commercial relations with them, and established some colonies in their territory. During the migration of nations in the 4th and the following centuries, Russia witnessed the movements of hordes of Goths, Alans, Huns, Avars, Bulgarians, and others. Soon after the name of the Slavs appears for the first time, a race, according to the general opinion of historians, identical with the Sarmatians, and believed to have extended northward as far as the upper Volga. The Slavs found scattered Finnish tribes dwelling in these territories, and drove them higher north toward Finland and the region of the Arctic sea. Such of these people as did not remove became amalgamated with the invaders, and gave their descendants that indifferent color of hair and sallow complexion which most Russians of our day possess. Thus the people now known as Russians are a compound product of the various Slavic tribes, of many Scythic tribes, especially the Tartars, who in the middle ages oppressed Russia for centuries, and of Finns. (See SLAVIC RACE AND LANGUAGES.) The Slavs founded the towns of Novgorod and Kiev, both of which became the capitals of independent Slavic principalities. After a history of about 100 years, of which nothing is known, the principality of Novgorod, of unknown extent, and surrounded by a number of tribes of Finns of the Tehudic branch, appears struggling against the invasion of the Varangians (called by the Slavs Rus), a tribe of Northmen, who succeeded in making both the Slavs and Finns tributary. For a time the Slavs threw off the yoke of the Varangians, but sinking into anarchy and feeling themselves unable to cope with internal and external foes, they, together with some of the neighboring Finnish tribes, invited Rurik, the

prince of the Varangians, to Novgorod, where he arrived about 862, with his brothers Sineus (or Sinaf) and Truvor, and laid the foundation of the great Russian empire. For nearly 200 years Russia remained under the autocratic power of the descendants of Rurik. He died in 879, leaving the empire, not to his son Igor, who was only four years old, but to his cousin Oleg, a great conqueror and wise ruler. Oleg (879-912) conquered the principality of Kiev and united it with his own, vanquished the Khazars (probably a people of Turanian origin, who in the 7th and 8th centuries had established a powerful kingdom between the Dnieper and the Caspian, being ruled for a time by a dynasty converted from Islam to Judaism), drove the Magyars out of the borders of Russia toward the country now occupied by them, and made an expedition by land and sea (with 900 vessels) against the emperor of Constantinople, with whom in 911 he concluded an advantageous peace. Igor, the son of Rurik (912-'45), put down an insurrection of the Drevlians on the Pripet, conquered the Petchenegs, who lived on the coasts of the Black sea from the Danube to the mouths of the Dnieper, made an unsuccessful war against the emperor of Constantinople in 941, and was slain in a second war against the Drevlians. During the minority of his son Sviatoslav (945-'72), his widow, the celebrated Olga, held the reins of government with wisdom and energy. In her reign Christianity began to spread in Kiev, and Olga herself was baptized in 957 at Constantinople. Her son Sviatoslav, who remained a pagan, won new victories over the Khazars, subdued the Bulgarians and Petchenegs, and was slain by the latter, while returning through their territory from a war against Constantinople. He had extended the borders of the empire to the sea of Azov, and in 970 divided it among his three sons, giving Kiev to Yaropolk I. (972-'80), the country of the Drevlians to Oleg, and Novgorod to Vladimir. In a war which arose between the three brothers, Oleg was slain and Vladimir fled, and the whole empire was reunited under Yaropolk; but in 980 Vladimir returned with Varangian hordes, conquered Novgorod and Kiev, and, having put his brother to death, became the ruler of all Russia. Vladimir, surnamed the Great on account of the benefits he conferred on the empire, conquered Red Russia and Lithuania, and made Livonia tributary. He at first opposed Christianity, but subsequently declared himself ready to embrace the doctrines of the Greek church, married the sister of the emperor of Constantinople, and was baptized in 988 on the day of his wedding. He soon after ordered the introduction of Christianity into the entire empire, established churches and schools, and founded new towns. He divided the empire among his twelve sons, who, even before the death of the father in 1015, engaged in a fratricidal war, in which at length Sviatopolk, a son of Vladimir's broth-

er Yaropolk I., but adopted by Vladimir, possessed himself of the throne, after murdering three of his brothers. Another brother, Yaroslav, allied himself with the emperor Henry II. of Germany against Sviatopolk, and the father-in-law of the latter, King Boleslas of Poland. The war lasted till 1019, when a three days' battle decided in favor of Yaroslav, and Sviatopolk died on his flight in Poland. Yaroslav (1019-'54) for some time was sole ruler; but in a war against his brother Mstislav, prince of Tmutorakan on the strait of Yenikale (who in 1016 had destroyed the Crimean remnant of the kingdom of the Khazars, and in 1022 subdued the Circassians), he was routed in 1024, and purchased peace by ceding to his brother one half of the empire. After the death of Mstislav in 1036, the entire empire became once more united under Yaroslav. By several successful wars he considerably enlarged its territory, and like his father introduced many useful reforms. He caused the translation of many Greek works into Slavic, built churches and schools, increased the number of towns, peopled many waste tracts of land, and ordered the compilation of the *Russkaya Pravda*, the first Russian code. Three of his daughters were married to the kings of Norway, France, and Hungary. A few days before his death he divided the empire among his four sons, with the provision that the three younger ones should obey the eldest brother Izaslav, to whom he gave Kiev and Novgorod. But this provision proved of little avail; the four divisions of the empire were again subdivided, and the Russian monarchy was finally changed into a confederacy. The power of the nation was broken by a never ceasing internal war, and large territories in western Russia were taken possession of by the Poles, Lithuanians, Danes, Teutonic knights, and others. Yet many important cities were founded during this period, as Moscow about 1147; and Kiev and Novgorod took their place among the wealthiest and most prosperous cities of Europe. The calamity of civil war was soon followed by one still greater. From eastern Asia innumerable hordes of Mongols under Genghis Khan and his sons advanced toward Russia. The princes made a fruitless attempt to arrest their course. The danger from abroad did not cure the internal dissensions; and after the invaders, who had won the bloody battle of the Kalka, turned back to Asia, internecine war recommenced, accompanied by famine and pestilence. In 1230, 30,000 men died of the plague in Smolensk, and 42,000 in Novgorod. Soon after the Mongols returned under Batu. Many towns and villages were sacked, and far and wide the soil reeked with the blood of the murdered inhabitants. The princes had to pay heavy tribute to the Mongols, and though many of them occasionally gained some victories, they did not succeed in restoring the independence and greatness of Russia. Alexander

Nevski (1247-'63), at first prince of Novgorod, which state had remained almost independent of the Mongols, won signal victories over the Swedes, Livonians, and Lithuanians on the Neva (hence his surname). With reference to the Tartar invaders, a better era began only with Ivan (John) I. Kalita, prince of Moscow (1328-'40). He united the principality of Tver with Moscow, embellished his capital with many new churches, and in 1339 began the reconstruction of the Kremlin. Some time before his death he retired into a convent and died as a monk. He managed to keep up friendly relations with the Tartars, and thus gave the people a chance to recover their strength and to organize a new army, which, under one of his successors, Demetrius (Dimitri), routed the Mongols in 1378, and again in 1380 on the Don (hence his surname Donski), where 100,000 Mongols are said to have been slain. But in 1382 they again returned, burned Vladimir and Moscow, and slew in the latter city alone 24,000 inhabitants. Demetrius was obliged to purchase peace by heavy sacrifices, after which he took revenge on the Russian princes to whose defection he owed his last defeat, and all of them save the prince of Tver were subjected to his rule. The power of the grand principality (improperly called grand duchy) of Moscow was greatly increased during the reign of Basil (Vasili) II. (1389-1425) by the incorporation of Nizhni Novgorod and Suzdal, and under Basil III. (1425-'62) by the incorporation of Halicz, Mozhaïsk, and Borovsk. During the reign of the latter the metropolitan Isidore of Kiev took part in the general council of Florence (1439), and subscribed to the act of union of the Greek and Latin churches; but Basil disapproved this step, and ordered Isidore to be thrown into prison, whence after some years he escaped into Italy. A new period in the history of Russia begins with its entire deliverance from the rule and influence of the Mongols through Ivan III., surnamed the Great (1462-1505). Having strengthened his power by a victory over the khan of Kazan, whom he made tributary in 1469, and by the conquest and annexation of Novgorod, Perm, and Pskov, he declared to the ambassadors of the Mongols that Russia would henceforth cease to pay them tribute, and successfully resisted their renewed invasion. He then conquered and annexed several more Russian principalities, and a part of Siberia in 1499. But in a war against the Livonians, who were aided by the Teutonic knights, he was totally routed in 1501, and was compelled to conclude a truce for six years, and a little later a peace for 50 years. He married Sophia, a princess of the late imperial house of Constantinople, and, by right of his consanguinity to that house, adopted the double-headed eagle for his escutcheon. He improved the laws, regulated the public taxes, and was the first who assumed the title of autocrat of all the Russias. Under the reign of Basil IV. (1505-'33), the last semi-

independent principality ceased by the final incorporation of Pskov in 1510. The hereditary war of the Russians against Lithuania, which had become united with Poland under the Jagellos, was carried on by him with varying success; but the Tartars of Kazan were completely routed in 1524 and 1530 and made tributary. His son Ivan IV. (1533-'84) soon restored order by cruel energy, and history has surnamed him the Terrible. Yet he contributed more to the greatness of Russia than any of his predecessors. In 1545 he created a standing army, called the *strieltzi* (archers), in 1552 reconquered Kazan, whose ruler during his minority had made himself independent, in 1553 opened a commercial road to Archangel, in 1554 subdued Astrakhan, made successful campaigns in Livonia and Esthonia, and in 1570 united the country of the Don with his empire. In 1581-'2 a Cossack freebooter, Yermak Timofeyeff, conquered for him Siberia. But his attempt to drive the Teutonic knights out of Livonia failed, because the Germans, Poles (under Stephen Báthori), Danes, and Swedes united against him; and at the peace, concluded in 1582, he had to cede Livonia to Sweden. He greatly encouraged commerce, concluded commercial treaties with England, called many foreigners, especially Germans and Englishmen, into his empire, and in 1569 established a printing office in Moscow. In Novgorod, which he hated on account of the free spirit of the citizens, he put more than 60,000 men to death in 1570, adding to the slaughter the most exquisite tortures. Similar scenes occurred in Tver and Moscow. Finally, however, struck with remorse, he intended to abdicate and retire into a convent, but died before this design could be executed. His son Feodor (or Fedor) I. (1584-'98) was weak in mind and body, and, according to an order of his father, was assisted in the government by a state council. In 1588 his brother-in-law Boris Feodorovitch Godunoff, a man of great talents but immoderate ambition, obtained the sole control of state affairs. He aspired to the throne, and many of his rivals and several members of the imperial family were exiled or poisoned. Feodor himself is believed to have died of poison, and with him the house of Rurik became extinct. Boris Godunoff was called by the boyars to the throne. He established serfdom, but his reign was in many respects beneficent; law was impartially administered, arts and trades encouraged, many intelligent foreigners called into the empire, and the enlightenment of the people promoted. Yet civil war, cruelty against the boyars, and a terrible famine in 1601, by which in Moscow alone upward of 100,000 persons perished, created great dissatisfaction. An impostor, who claimed to be Demetrius the son of Ivan, and was aided by Polish magnates, stirred up a rebellion, and, after the sudden death of Boris Godunoff in 1605, dethroned Feodor, the son of the latter, and was himself

crowned as czar. But in the next year he lost crown and life in a conspiracy, and the Russian grandees made the boyar Shuiski czar, who was crowned on June 1, 1606, as Basil V. Ivanovitch. Another pseudo Demetrius rose against him, and, supported by the Poles, advanced victoriously toward Moscow. Basil sought and obtained an alliance with the Swedes, which induced Sigismund III. of Poland to espouse openly the cause of the pseudo Demetrius. The Swedish troops soon went over to the Poles, Moscow was forced to surrender (1610), and the czar was taken prisoner and died the next year in a Polish prison. Moscow was burned in 1611 by the Poles, who had been attacked there, and tens of thousands of the inhabitants were slaughtered; but in 1612 the Poles were forced by Pozharski and other popular leaders to evacuate Russia. In the next year the Russians elevated to the throne Michael Feodorovitch Romanoff, the first czar of the present imperial family. He was a son of Feodor, archbishop of Rostov and afterward patriarch of Moscow under the name of Philaret, whose grandfather had been connected by marriage with the house of Rurik. Michael (1613-'45) concluded in 1617 a peace with Gustavus Adolphus of Sweden and with the Poles, and devoted his whole energy to promoting the internal prosperity of his empire. Commerce, which had been entirely prostrate, was revived by treaties with England, France, Persia, and China; and the borders of his Asiatic possessions were extended in 1639 to the Pacific. Under his son Alexis (1645-'76) the Cossacks, who had risen under Chmielnicki against Poland, in 1654 acknowledged the sovereignty of the czar. A war with Poland ended with the restoration or annexation to Russia of Tchernigov, Smolensk, Kiev, and the Ukraine. The reign of his son Feodor III. (1676-'82) was signalized by many important reforms. According to his last will, not his imbecile brother Ivan, the heir apparent, but his half brother Peter, whose eminent talents he seems to have anticipated, was to succeed him. But the sister of Ivan, Sophia, plotted a conspiracy, in consequence of which both Ivan and Peter were proclaimed czars, and she herself obtained the regency of the empire. In 1689, however, Peter overthrew her rule, and shut her up for the remainder of her life in a convent. Ivan gladly abandoned his claim to the throne, which was now mounted by Peter, known in history as the Great. In a brief time he transformed the entire nation, though personally betraying barbarous impulses till his death. Russia became the most powerful empire of northern Europe, and henceforth regarded herself and was generally regarded as a leading member of the European family of states. In 1703 he founded a new capital, St. Petersburg, which soon became one of the richest cities of Europe. The victory over Charles XII. at Poltava (1709) destroyed the superiority of Sweden, and in the peace of

Nystad (1721) Peter incorporated Ingria, a part of Karelia, Esthonia, and Livonia with Russia. He was equally successful against Persia, which in 1723 ceded the provinces of Daghestan and other territories on the Caspian, with the towns of Baku and Derbent. His wife and successor, Catharine I. (1725-'7), guided and supported by two favorites of Peter, Menshikoff and Buturlin, made likewise many important improvements. She increased the army and navy, diminished the taxes, and recalled the exiles from Siberia. She concluded an offensive and defensive alliance with Austria, and sent an ambassador to China to propose a commercial treaty. She was succeeded by Peter II. (1727-'30), a grandson of Peter I., only 11 years old, during whose brief reign the princes Menshikoff and Dolgoruki successively controlled affairs. At his sudden death the crown devolved on Anna, the daughter of Ivan Alexeyevitch (half brother of Peter the Great), and widow of the duke of Courland. An attempt was made to force on her a "capitulation," restricting the rights of the crown in favor of the boyars; but Anna soon discarded the compact, exiled the princes Dolgoruki and Gallitzin, abolished the privy council, and reorganized the senate on an entirely new basis. The Kirghiz tribes in 1731 submitted to the protectorate of Russia, but the Persian provinces were lost. Under her reign the N. E. coast of Siberia and the Aleutian islands were discovered, and the incorporation of Siberia was completed. In the war of the Polish succession Anna took sides with Augustus III., who promised to her favorite, Duke Biron, the duchy of Courland, then a Polish fief. The success of Augustus secured the Russian influence in Polish affairs. In the war against Turkey, Moldavia was conquered by Münnich; but when Austria concluded the unfavorable peace of Belgrade (1739), Russia also laid down her arms and gave up Moldavia. After Anna's death (1740), her grandnephew Ivan, only a few months old, was proclaimed czar under the regency of Duke Biron of Courland; but he was soon dethroned by Elizabeth (1741-'62), the daughter of Peter the Great and Catharine I. In the first years of her reign Sweden was instigated by France to a war against Russia, which was terminated in 1743 by the peace of Abo, and secured to Russia the possession of some districts of Finland. In the seven years' war Elizabeth supported Austria, and the victories of Gross-Jägerndorf and Kunersdorf, and even the defeat of Zorndorf, apprised Europe of the great improvements introduced into the Russian army. Under her reign the death penalty and the rack were abolished, but sentences of exile, and cruel punishments dictated by her own resentment, were numerous. She established the academy of fine arts at St. Petersburg, the first Russian university at Moscow (1755), two colleges, and several other important literary institutions. She was succeeded by Peter III., the son of her sister, formerly

duke of Holstein, who immediately on his accession gave up the alliance with Austria, and concluded, first a peace, and soon after an offensive alliance with Frederick the Great. After a reign of only a few months, Peter lost the crown and his life by a court revolution, at the head of which was his own wife, a daughter of the duke of Anhalt-Zerbst, who now ascended the throne as Catharine II. (1762-'96). During her reign Russia gained a leading and decisive influence in the system of European policy, and was generally recognized as one of the great powers of Europe. Catharine fully comprehended the necessity of external peace for the development of the internal resources of the empire, and soon after her accession recalled the Russian troops who were taking part in the seven years' war. She surrounded her throne with a host of statesmen and warriors, more famous for ability than character, such as Gallitzin, Rumiantzeff, Panin, Orloff, Soltikoff, Suvaroff, Tchernitcher, Repnin, and Potemkin. She took a prominent part in the nefarious dismemberments of Poland in 1772, 1793, and 1795, and received herself the lion's share, consisting of nearly two thirds of the Polish kingdom; and in a number of successful wars she wrested from the Turks the Crimea, Azov, and several other territories. Altogether the territory of Russia was enlarged during her reign by nearly 225,000 sq. m., Courland being among the acquisitions. The internal progress was no less signal. More than 50,000 industrious foreigners settled in the fine agricultural districts of southern Russia as colonists, and a large number of new educational and charitable institutions were established. Commerce, navigation, and industry greatly improved under Catharine; the administration of the empire was thoroughly reorganized, and in 1766 the empress even convoked a general assembly of delegates from the provinces to consult respecting the compilation of a new code of laws. Her son, Paul I. (1796-1801), took an active part in the European war kindled by the French revolution, forming a defensive and offensive alliance against France, with England, Austria, Naples, and the Porte. His armies were sent in 1799 against the French republic to Italy, Switzerland, and Holland, and his chief commander, Suvaroff, not only increased the fame of the Russian arms, but greatly strengthened the Russian influence on European policy. Dissatisfied with his allies, Paul soon recalled the army, concluded with Denmark and Sweden a convention of armed neutrality, and even made friendly advances toward France, when a conspiracy of Russian nobles, who had suffered much from his despotic caprices, led to his assassination. His son, Alexander I. (1801-'25), was strongly inclined in favor of a peaceful policy, though he found it impossible to keep out of the general war. In 1801-'2 he was active in promoting the treaties which led to the gradual dissolution of the German

empire. About this time he incorporated with Russia all the provinces of Georgia. The faithlessness of Napoleon toward Naples and Hanover, and the execution of the duke d'Enghien (who was carried off from Baden), induced Alexander to enter into an anti-French alliance with Austria, England, Sweden, and Naples. A grand army under Kutuzoff marched into Moravia, united with the Austrians, and with them was routed at Austerlitz, where Alexander was himself present, Dec. 2, 1805. Not more fortunate was the alliance of Alexander with Prussia. After the indecisive battle of Eylau, Feb. 7, 8, 1807, the Russians were totally defeated in the bloody battle of Friedland (June 14), and Alexander was forced to conclude the peace of Tilsit (July 7), by a secret article of which he surrendered the Ionian islands to France, while he received from Prussia the district of Bialystok, with 184,000 inhabitants. Moreover, Russia had to give its adhesion to the continental system, and to close its ports to British vessels. A war with the Turks, which had been instigated by Napoleon, terminated in favor of the Russians, who occupied Moldavia and Wallachia. The peace of Tilsit raised two new enemies against Russia: England, which desired to take revenge for the adhesion of Russia to the continental system, and inflicted great damage on Russian commerce; and Gustavus IV. of Sweden, who in a brief and unfortunate war lost the crown for himself and for his race, while Sweden, in the treaty at Frederikshamn, Sept. 17, 1809, ceded Finland, the Aland islands, and a portion of Bothnia, a territory with 900,000 inhabitants. For five years Alexander remained on good terms with Napoleon, and in the treaty between France and Austria at Schönbrunn (Oct. 14, 1809) Russia received from Austria the district of Tarnopol in Galicia, with 400,000 inhabitants. Turkey, in the peace at Bucharest in 1812, was obliged to cede Bessarabia and a part of Moldavia; and Persia, in the peace at Gulistan in 1813, to surrender Daghestan and Shirvan, former conquests of Peter the Great. Another great war with France became inevitable when Alexander found it necessary, by a ukase of Dec. 31, 1810, to set aside one of the provisions of the peace of Tilsit. In 1812 Napoleon invaded Russia with an army of 500,000 men, for which Italy, the kings of Prussia and Saxony, and other vassals had been compelled to furnish large contingents. The Russians lost the bloody battle on the Moskva, Sept. 7, and even Moscow fell into the hands of the French; but the burning of the city by the Russians was the beginning of a frightful retreat of the French, during which nearly the whole grand army was destroyed. On Feb. 28, 1813, Russia was joined in her war against France by Prussia, and in August by Austria; two months later the battle of Leipsic decided the issue of the great Franco-Russian war, and in 1814, and again in 1815, Alexander entered

Paris as the foremost among the allied monarchs to whom Napoleon succumbed. In the congresses of Vienna (1814-'15) and Aix-la-Chapelle (1818), which reorganized the political relations of the European states, the influence of Alexander, the founder of the "holy alliance," was paramount; the duchy of Warsaw, which Napoleon had created, was surrendered to him, and transformed into a kingdom of Poland under the Russian sceptre; and in the contest which soon sprung up throughout Europe between the liberal and democratic tendencies of the age and the hereditary rights of the princes, Russia was regarded as the chief support of the latter. At the same time Alexander was eagerly intent on promoting the civilization of his empire and developing its immense resources. The system of public instruction was greatly improved, and religious reforms were encouraged; serfdom had been abolished in Courland and Livonia. The death of Alexander, Dec. 1, 1825, accelerated the outbreak of a conspiracy which had wide ramifications throughout Russia, and especially in the army; but his brother and successor, Nicholas I. (1825-'55), suppressed it with great energy, and the leaders of the conspiracy were either put to death or exiled to Siberia. A war, begun by Persia immediately on receiving the intelligence of the death of Alexander, was victoriously terminated by Paskevitch; and by the peace of Turkmanchai, Feb. 22, 1828, Russia gained the provinces of Erivan and Nakhitchevan, 80,000,000 rubles as indemnity, and the exclusive control of the Caspian sea. A war against Turkey commenced in 1828 was equally successful, the Turks being obliged to cede in the peace of Adrianople (Sept. 14, 1829) several fortresses on the frontier and the mouths of the Danube, and to pay a large indemnity. The heroic efforts of the Polish nation in 1830-'31 to recover its independence at length succumbed to the overwhelming power of the czar, who by a ukase of 1832 declared the kingdom of Poland a Russian province without diet and without its own army, and openly announced his intention gradually to transform the Poles into Russians. The same plan was pursued with regard to the numerous other tribes and nationalities of the empire, and no means was left untried to extend the dominion of the Russian language and the Russian church. A war against the independent tribes of the Caucasus, who after 1834 were led by Shamyl, was carried on, with but little interruption and with varying success, through the entire reign of Nicholas. In 1849 a Russian army was sent to the aid of Austria against the Hungarians, and assisted in the suppression of the revolution. In 1853 Russia demanded from the Turkish government certain guarantees of the rights of the Greek Christians of Turkey, which the Porte believed to involve an actual abdication of its sovereignty, and which it therefore refused to concede. This led in the same

year to the beginning of the "eastern war," in which France, England, and Sardinia took sides (1854) with Turkey, on the ground that the existence of the latter empire and the equilibrium of political power in Europe were endangered by Russia. This war, which culminated in the siege and capture of Sebastopol, was terminated under Nicholas's son and successor, Alexander II., who ascended the throne on March 2, 1855. (See CRIMEA.) By the treaty of Paris (March 30, 1856) Russia lost a small strip of land in Bessarabia, and her naval preponderance in the Black sea. She recovered the latter, however, by withdrawing from the treaty of Paris in 1870, when France was engaged in a disastrous war, while England alone was unable to compel Russia to respect the treaty. A large fleet for the southern waters is now (1875) in course of construction. The reign of Alexander II. opened with a series of liberal reforms, which at once aroused the slumbering energies of the nation. (See ALEXANDER II., and GORTCHAKOFF.) The war in the Caucasus terminated with the capture of Shamyl in 1859. A new rising in Poland, which broke out in January, 1863, was crushed in the following year, and in consequence of it the administration of that country was entirely assimilated to that of Russia proper, the long exercised Russianizing process being developed with the utmost rigor. (See POLAND.) Favorable commercial treaties were concluded in 1858 and 1860 with Japan and China, and from the latter power a valuable and extensive tract of land on the river Amoor was acquired, while the Japanese have ceded to Russia all their claims on the island of Saghalien. On the other hand, Russia sold to the United States in 1867 the vast territory of Alaska, which had been occupied since the reign of Paul. A telegraph line has been completed from St. Petersburg to Yokohama, and the Siberian railway is speedily pushing forward toward the Pacific coast. Another railway line, the Central Asian, is in process of construction to Tashkend, a very important commercial town, and the rendezvous of the caravans of Turkistan.—The Russian conquests in central Asia have recently attracted general attention, though the Russian advance into these regions began centuries ago, when the czars of Moscow, freed from the Tartar invasion, began to retaliate upon the invaders, and endeavored to find a market for their manufactures, which, being of a very inferior quality, had no sale in Europe. Between the Ural river, which forms a part of the natural eastern boundary of European Russia, and the Irtysh, formerly on the S. W. frontier of Siberia, extended boundless steppes, the whole population of which consisted of a few thousand wandering Kirghiz. These tribes, when not fighting among themselves, united in attacks upon the Russian frontier settlements, and compelled the Russians to pursue them into the interior of the steppes. During these continued fights

some of the tribes submitted to the Russian rule, but for two centuries no one could say who was the real master of the vast tracts of land which lay between the rich and fruitful khanates of central Asia and the banks of the Ural and Irtish. There was much trade between these khanates and the towns of Astrakhan and Orenburg, but it was carried on chiefly by Bokhara merchants coming across the steppes, not by Russian merchants venturing abroad; for while the former managed to get safely with their caravans through the wilderness and to make good bargains with the Muscovites, the latter ran great risk of being robbed and killed in the steppes, or robbed and sold into bondage in the khanates themselves. So great was the desire of the Russians to get the silk and cotton of Bokhara and Khiva in exchange for their own products, that the merchants of the khanates trading in Russia were exempt from all taxes and duties, notwithstanding the bad treatment the Russian merchants underwent in the khanates and the heavy duties levied upon their wares. Under the emperor Nicholas the first attempts to compel the khanates to a fairer way of trading were made, but with little success. The expedition of Count Perovsky in 1839-'40 perished under the combined influence of want of water and food and of constant fights with the overwhelming forces of the khans and the hostile nomadic tribes. But toward the end of the reign of Nicholas the steppes beyond the river Ural came, somehow or other, to be considered as Russian territory; they were called domains of the Kirghiz of Orenburg and of the Kirghiz of Siberia respectively, and some outpost settlements were established, not only on the steppes, but even beyond them on the banks of the Sir Darya. Of these Fort Perovsky, which was almost a fortress, was both the most distant and the most important, since it enabled the Russians to launch two steamers on the sea of Aral, and thence to navigate a portion of the Sir Darya. Yet occasionally whole settlements were exterminated by the wandering tribes, and many of the fortified outposts were regularly besieged by the united troops of the khan of Khokan and the emir of Bokhara. A special committee appointed to investigate the state of affairs in the Asiatic dominions pronounced it absolutely necessary to "unite the new outpost line on the Sir Darya with the advanced posts on the southern frontier of Siberia." This resolution practically meant the erection of new fortified places further along the Sir Darya to the foot of the Thian-shan mountains and to the lake of Issik-kul, and had been approved by Nicholas when the Crimean war caused the government to postpone all its projects in Asia. About 1860 the project was resumed, the first steps being taken from Siberia by the construction of Forts Viernoye and Kastek at the foot of the Thian-shan. A double advance was executed in 1863 by

small detachments toward and along the Sir Darya. The Khokan fortresses Pishpek and Tokmak, and Yeni Kurgan, were occupied. About the beginning of 1864 the two detachments were comparatively near each other, and in June the western, commanded by Col. Verefkin, took Hazret-i-Turkistan; while about the same time the eastern, commanded by Col. Tcherniayeff, captured the fort of Auliet. The ends of the two lines were thus nearly joined, and in October Col. Tcherniayeff, commanding the united detachments, entered Tchemkend. The original object of the Russian government was thus accomplished, and it was Alexander's intention to stop any further advance of his troops; but the khans of Bokhara and Khokan, and subsequently of Khiva, by their constant attacks on the Russian outposts, compelled the generals to advance further. Tashkend was taken in 1865, Khojend in 1866, and Samarcand, by Gen. Kaufmann, in 1868. The same general vanquished the khan of Khiva in 1873 (see *KHIVA*), and in September, 1875, after another victory, took the city of Khokan. The cessions which the khan of Khiva was forced to make brought the entire E. coast of the Caspian sea into the hands of Russia, so that she can now keep her military lines of operation in perfect order by constant supplies by rail, river, and the sea, from St. Petersburg and the Baltic. The Russian government has determined to connect the Caspian sea and the sea of Azov (and through the latter the Black sea) by a canal 750 m. long, which, it is estimated, can be finished in six years at a cost of about \$62,000,000. By it the military strength of the whole southern coast region will be materially increased, for through it fleets will be able to penetrate from the Black sea into the Caspian, and there unite for a combined attack or a common defence. Such is the military importance of the Caspian sea in the estimation of Russia, that while reserving to herself the unrestricted use of its waters, she has imposed a treaty on Persia which prevents that power from maintaining any vessels of war upon it, notwithstanding that its S. and S. W. shores are part of its territory. There is an active commercial movement on the Caspian, but it is almost exclusively Russian. More than 800 vessels annually enter its ports, engaged in trade with Persia, Tartary, and the Caucasus. —But the greatest event in recent Russian history is the emancipation of the serfs, decreed by Alexander II. on March 3 (Feb. 19, O. S.), 1861. The early history of Russia was marked by unlimited despotism on the part of the princes, and equally unlimited insurrectionary tendencies on the part of the subjects. The murdering of princes was common, and it was only by organizing large body guards that they maintained their power. These guards subsequently became nobles and were largely endowed with territorial possessions. The peasants worked on these estates, with perfect freedom to move from one to another,

until the close of the 16th century, when they were "fastened" to the soil, that is to say, were no longer permitted to move from the places where the ukase found them. The object of this fastening of the peasants to the land on which they lived was not so much to enrich the landowners by giving them serfs, as to secure the revenues of the crown; for as long as the peasants were free to move about, they actually formed a vast body of wanderers constantly avoiding all payment of taxes or any other contribution to the government. To take a census under such circumstances was impossible, and that is one of the reasons why the early statistical data concerning the population of Russia are so highly untrustworthy. Such lands as did not in the stricter sense belong to the princes or the nobles were at all times considered as constituting the property, not of individual peasants, but of whole communities. They were periodically, generally every nine years, divided among the families of the community, in equal lots, according to the number of heads, and without regard to former tenantry; only the dwellings, cattle, and horses forming personal property. This system of division and rotation excluded both destitution and a regular cultivation of the land; and in it lies the explanation of the great favor which communistic views have at all times found in Russia. Trade and industry being at a very low stage of development, few private fortunes were accumulated as in other parts of the world. The wealth of representative men in Russia came mainly as the gift of the sovereign, and from the large extent of territory, the want of proper communications, and the impossibility of gathering information concerning distant regions, the princes very frequently made presents to the nobility of land not vacant, but belonging to one or more communities of peasants. The inherent right of peasants to own a certain portion of land was tacitly acknowledged by the legislation on emancipation; for instead of being simply declared free, every one of them was endowed, according to the fertility of the land, with from 5 to 25 acres, with a house and a bit of orchard attached to it, for which he is bound to pay, during a stated number of years, a certain tax to the government, which undertook to compensate the landowners. The great result achieved by this reform is that there is now no agricultural laborer in any part of the empire who is not a small landowner and a householder. The agricultural classes are in so far incomparably better off than the artisans, mechanics, or even members of the liberal professions.—Among the numerous works on Russia, besides those in Russian by Karamsin, Polevoi, Pogodin, Ustrialoff, Solovieff, and others, the following are prominent: Strahl and Hermann, *Geschichte von Russland* (6 vols., Hamburg, 1832-'60); J. G. Kohl, various books of travel through European Russia (1841 *et seq.*); Haxthausen, *Studien über die innern Zustände, das Volksleben und insbesondere die*

ländlichen Einrichtungen Russlands (3 vols., Hanover, 1847-'52); N. Turgeneff, *La Russie et les Russes* (3 vols., Paris, 1847); Schnitzler, *Histoire intime de la Russie sous les empereurs Alexandre et Nicolas* (2 vols., Paris, 1847), *Les institutions de la Russie depuis les réformes de l'empereur Alexandre II.* (2 vols., 1867), and other works; Gurowski, "Russia as it is" (New York, 1854); Pauly, *Description ethnographique des peuples de la Russie* (St. Petersburg, 1862); Golovin, *Études et essais: Richesse de la Russie, &c.* (Paris, 1864), and other works; Köppen, *Statistische Reise in Russland* (St. Petersburg, 1864); Buschen, *Aperçu statistique des forces productives de la Russie* (Paris, 1868); Eckardt, *Die Baltischen Provinzen Russlands* (Leipsic, 1868), *Baltische und Russische Culturstudien* (Leipsic, 1869; both translated under the title of "Modern Russia," &c., London, 1870), and *Russlands ländliche Zustände seit Aufhebung der Leibeigenschaft* (Leipsic, 1870); W. Hepworth Dixon, "Free Russia" (2 vols., London, 1870); Barry, "Russia in 1870" (London, 1871); Mrs. Guthrie, "Through Russia from St. Petersburg to Astrakhan and the Crimea" (2 vols., London, 1874); Ralston, "Early Russian History" (London, 1874); and Lengenfeldt, *Russland im XIX Jahrhundert* (Berlin, 1875). Erman established in Berlin in 1841 the *Archiv für wissenschaftliche Kunde von Russland*, a periodical exclusively devoted to the geography and history of Russia, and still (1875) continued. Dilke, Fadefeff, Hellwald, Mitchell, Kinglake, Sarauw, Stumm, Trench, Vámbéry, Vincent, Wirmann, and others have written upon Russia in central Asia and the Russian eastern question. (See p. 888.)

RUSSIA, Language and Literature of. The Russian language is the most widely spread and important idiom of the great Slavic family of languages, of which it forms the easternmost branch. It is distinguished by regularity, flexibility, a fitting mixture of softness and force, and especially by copiousness, as it has assimilated and worked up an immense number of Scandinavian, Tartar, Finnish, and other non-Slavic roots. The alphabet consists of 36 letters representing the following sounds or marks: А, а, It. *a*; Б, б, *b*; В, в, *v* (also *f*); Г, г, hard *g* (also *h* and *y*); Д, д, *d*; Е, е, It. *e*, also *ye*, as in Eng. *yellow*, and *u*, as in *but*); Ж, ж, Fr. *j* (*zh*); З, з, *z*; И, и, It. *i*; І, і, І, the same; К, к, *k*; Л, л, *l*; М, м, *m*; Н, н, *n*; О, о, It. *o*, also Eng. *o*, as in *hot*; П, п, *p*; Р, р, *r*; С, с, *s*; Т, т, *m*, *t*; У, у, It. *u*; Ф, ф, *f*; Х, х, *kh* (Ger. *ch*); Ц, ц, *tz* (It. and Ger. *z*); Ч, ч, *tch* (Pol. *cz*); Ш, ш, *sh*; Щ, щ, *shch* (Pol. *szcz*); Ъ, ъ, mark of hardness; Ы, ы, Ger. *ü* (nearly; Pol. *y*); Ь, ь, mark of softness; Э, э, *ye*; Ъ, ѡ, *e*; Ю, ю, *yu*; Я, я, *ya*; Ѡ, ѡ, *f*; Ѳ, ѳ, *v*, It. *i* (also *v*); Ѵ, ѵ, *y* consonant (Ger. *j*). The grammatical structure is like that of the Polish, but the accent is varied. The following examples will show some of the gram-

matical features: Masculine noun declined: nom. sing. *tzar*, (a, the) czar or king; gen. *tzarya*; dat. *tzaryu*; acc. *tzarya*; voc. *tzar*; instrumental, *tzarem*; indicative, *tzarye*; pl.: *tzari*, *tzarei*, *tzaryam*, *tzarei*, *tzari*, *tzaryami*, *tzaryakh*. The indicative is always used with a preposition, of, on, or the like: *o tzarye*, of the czar; *na tzaryakh*, on the czars. Feminine noun, sing.: *ruka*, hand, *ruki*, *rukye*, *ruku*, *ruka*, *rukoyu*, *rukye*; pl. *ruki*, *ruk*, *rukam*, *ruki*, *ruki*, *rukami*, *rukakh*. Neuter noun, sing.: *zerkalo*, looking glass, *zerkala*, *zerkalu*, *zerkalo*, *zerkalo*, *zerkalom*, *zerkalye*; pl.: *zerkala*, *zerkal*, *zerkalam*, *zerkala*, *zerkala*, *zerkalami*, *zerkalakh*. Adjective masc. sing.: *mudry*, wise, *mudravo*, *mudromu*, *mudravo*, *mudry*, *mudrym*, *mudrom*; pl.: *mudryye*, *mudrykh*, *mudrym* (*mudrykh*), *mudryye*, *mudrymi*, *mudrykh*. The personal pronouns are the following: *ya*, I; *ty*, thou; *on*, he; *ona*, she; *ono*, it; *my*, we; *vy*, ye; *oni*, *onye*, they. The first 10 numerals (masc.) are: *odin*, *dva*, *tri*, *chetyre*, *piat*, *shest*, *sem*, *osem* or *vosem*, *desiat*, *desiat*. The perfect of the verb *bit*, to be, is—sing.: *ya byl*, I have been, *ty byl*, *on byl*, *ona byla*, *ono bylo*; pl.: *my byli*, *vy byli*, *oni* and *onye byli*. How far the language is susceptible of assimilating foreign words, especially German and French, can be seen from a few examples: general, *heneral*; civilization, *tzivilizatzia*; department, *departament*; ministry, *ministerstvo*; poetry, *poezia*; prose, *proza*; theatre, drama, tragedy, comedy, *teater*, *drama*, *trahedia*, *comedia*, and so on. Among the best grammars of the Russian language for the use of foreigners are those in German by Heym, Vater, Schmidt, Tappe, Oldekop, Boltz (2d ed., 1854), Joël (1860), and Boech-Arkossy (1864), and in French by Langen (1825) and Reiff (2d ed., 1859). Among the best dictionaries are those of Heym, *Russisch-deutsches und deutsch-russisches Wörterbuch* (Riga, 1795-'8; Russian, German, and French ed., Leipsic, 1844); Tatishcheff, *Nouveau dictionnaire françois-russe* (2 vols., Moscow, 1832); Oldekop, *Russisch-deutsches und deutsch-russisches Wörterbuch* (last ed., St. Petersburg, 1843); and Makaroff's French-Russian and Russian-French dictionaries (St. Petersburg, 1868). There is an English-Russian grammar and dictionary by Constantino (3 vols. 8vo, London).—The first germs of literary life in Russia appear in the time of the introduction of Christianity by Vladimir the Great (about 990). The Slavic translation of the Bible and the introduction of Old Slavic liturgical books by Cyril and Methodius led to the general adoption of the Old Slavic as the written language, while the common Russian language began to form itself from the various dialects of the mixed population. No monuments whatever are left to show the condition and growth of the Russian language at this early stage; even the popular songs which elucidate the beginning of many other literatures have reached us only intermixed with later alterations. In the Old Slavic lan-

guage we have the treaties of the princes Oleg and Igor with the Greeks of the years 911 and 944, and an address of Sviatoslav; but whether their origin really belongs to this ancient time, or whether they are more recent translations from the Greek, is uncertain. An important Old Slavic work, *Russkaya Pravda* ("Russian Justice"), which was composed during the reign of Yaroslav (about 1020), was discovered in 1738 by Tatishcheff, and published by Schlözer (St. Petersburg, 1767). Nestor, the father of Russian history, belongs to the same period (died about 1114). The rule of the Mongols over Russia interfered but little with the growth of Russian literature, for the conquerors spared the convents, in which science found a safe refuge. Among the few works of this early period which have been preserved are the "Annals" of Simon, bishop of Suzdal (died 1226), a work of the metropolitan Cyprian (died 1406), a part of the "Sophia Chronicles" from 862 to 1534 (published by Stroyeff, Moscow, 1820-'22), and a considerable number of fables and tales, mostly centring round Vladimir and his knights, and bearing great resemblance to the tales of the round table. Among the most celebrated old Russian poems is the *Pesnia o polku igorevom* (on the expedition of Igor against Polotzk), written about 1200. It was discovered in 1796 by Count Mussin-Pushkin at Kiev, and has since been often published (with a German translation by Hanka, Prague, 1821). The long duration of the Mongol rule caused a number of Mongol words to be received into the Russian language, which are still in use. After the expulsion of the Tartars, Ivan III., Ivan IV., and especially Michael Romanoff, gave a new impulse to the progress of Russian literature, by establishing new schools, encouraging scholars, and calling distinguished foreigners into the empire. Among the authors of this period are the metropolitan Macarius (died about 1564), who wrote biographies of saints, Russian divines, &c., and Matvieyeff, the author of several historical works. Nikon, patriarch of Russia (died 1681), had the Bible translated into the Slavic language, and caused a revision of the Slavic liturgical books after the Greek originals, for which purpose more than 500 Greek manuscripts were collected by his order. But the great drawback to the rise of a truly national and popular literature, the use for literary purposes of another language than that of the people, was not removed until the reign of Peter the Great, under whom the intellectual condition of Russia underwent a revolution no less thorough than the material. He abolished the use of the Old Slavic as the official language of the government, and took energetic steps for superseding it as the language of literature. He fixed the alphabet of the common Russian language, superintended at Amsterdam the casting of the first types, and gave to a printer of Amsterdam, who in 1699 published the first book in the Russian lan-

guage, the monopoly of printing Russian books for 15 years. The first newspaper was established in Moscow in 1704, and the first in St. Petersburg in 1705. Peter instituted the imperial academy of science according to a plan of Leibnitz; it was opened shortly after his death, by Catharine I. (1725). The impetuosity with which Peter endeavored to give to his empire a literature did not leave him time to establish it on a native basis, and to develop the national resources; the writers whom he urged on to write naturally brought many foreign and heterogeneous elements into the rising literature. An Italian theatre was opened at the Russian court in 1730, and a German one in 1738. Among the principal authors of this time were Demetrius, metropolitan of Rostov (1651-1709), who wrote biographies of the saints (4 vols., Kiev, 1711-'16); Theophan Procopovitch (1681-1736), metropolitan of Novgorod, who left about 60 theological and historical works; Basil Nikititch Tatishcheff (1686-1750), who wrote a history of Russia in 4 vols.; Prince Cantemir, a satirical poet; the two Cossack poets Klimovski and Daniloff; the historian Prince Khilkoff (died 1718), who wrote a "Summary of Russian History;" Ivan Kyriloff, a statistician and geographer; and Basil Grigorovitch, who described a journey to western Europe. Trediakovski improved Russian prosody, but his poems exhibit more learning than poetical genius.—The work begun by Peter the Great was carried on with great vigor and success by the empresses Elizabeth and Catharine II. Elizabeth, who regarded art and science as the brightest ornaments of her court, founded the university of Moscow, and the academy of arts in St. Petersburg. Catharine II. added new and immense fields to the literary production of the country, by establishing public schools throughout the empire. She also established normal schools, liberally supporting the pupils, enlarged and patronized the academy of sciences and the academy of arts, and established in 1783 the academy for the perfection of the Russian language and history. At the head of the authors of this period stands Lomonosoff (died 1765), the father of the modern Russian language. He wrote the first critical Russian grammar, was the first to write pure and genuine Russian prose, and is still valued as a lyric poet. The first dramatic writer of note was Sumarokoff (died 1777), who with almost equal success wrote also historical and other poetical works. For the exhibition of his dramas national theatres were established at St. Petersburg (1756) and Moscow (1759). Among the other distinguished poets of this time were Kheraskoff (1733-1807), one of the most prolific writers of Russia, and Bogdanovitch, whose romantic poem *Dushenka* has become one of the favorites of the nation. Derzhavin (1743-1816) exhibited a greater originality than any of the preceding poets. His lyric, didactic, and dramatic works still hold

a high rank, and his "Ode to God" has been translated into nearly all civilized languages. Von-Vizin (died 1792) was particularly successful as a writer of comedies, some of which, as his *Nedorosl*, are still performed at the national theatres; he was also the best prose writer of this period. Kapnist as a lyric poet equalled Derzhavin in tenderness and purity of language, and was his superior in poetical genius. In dramatic poetry Kniazhnin (died 1791) is almost the peer of Sumarokoff. Count Khvostoff deserves honorable mention for his comedies, and Prince Dolgoruki (1764-1823) for his philosophical odes and epistles. Platon, metropolitan of Moscow, wrote numerous works on ecclesiastical history. A "History of Russia" was written by Shtcherbatoff (1733-'90); Boltin (1735-'92) wrote critical essays on the ancient history of Russia; Tchul-koff, a "History of Russian Commerce;" Golikoff, "Collections for a Biography of Peter the Great;" and Pleshtcheyeff, "Statistics of Russia." Muravieff (1757-1807) wrote many pedagogical, moral, and historical essays, all of which exhibit depth and nobility of feeling, keenness of thought, and an accomplished style. Novikoff (1744-1818) founded a typographical society, and established a satirical journal which had considerable influence in literary circles. The critical study of the language was greatly promoted by a "Comparative Dictionary of the Russian Language" (St. Petersburg, 1787-'9), for which Catharine II. herself drew up the plans.—The history of Russian literature in the 19th century exhibits steady progress. Alexander I. was a liberal patron of literature; he increased the number of universities and established many new literary institutions. Under Nicholas I. Russian literature emancipated itself fully from the controlling influence of foreign elements, assumed a thoroughly national character, and received new inspiration from the rise of the Pan-slavic movements, both political and literary, in which Russia, as the foremost representative of the race, seemed to be required to play a prominent part. The new period beginning with the 19th century was opened in a worthy manner by Nicholas Karamsin (1765-1826), who delivered Russian prose from the dominion of bombast, and set a brilliant example of a plain, flowing, and sprightly language, especially in his chief work, a "History of Russia," in 12 vols. He seems to have taken Wieland as a model. Many of his followers even outdid him in imitating the German classics, and there was danger of Russian literature becoming Germanized, when a reaction arose through Shishkoff (1754-1841), minister of public instruction, and a distinguished poet, philologist, and translator. The old Russian and purely national tendencies found a centre in the "school of Moscow." The victory of that school is in great part due to the genius of Pushkin (1799-1837), whose poems afford a faithful and patriotic reflection of Russian life, which forms the subject of

nearly all his works. He is, in particular, the founder of the national tragedy (by his "Boris Godunoff," 1831), for which he used, following the example of Zhukovski, the iambic metre, which was adopted by many, although others retained the Alexandrine verse. Zhukovski himself (1783-1852) is one of the greatest poets of Russia; he was the founder of a romantic school, and distinguished himself in almost every kind of poetry. Dmitrieff (1760-1837) distinguished himself equally in satire, epistle, hymn, and epigram. The poets Kryloff, Khomiakoff, and Koltzoff also belong to this period. Among the followers of Pushkin must be named Baratynski (died 1844), Delvig (1798-1831), Benedictoff, and Podolinski. One of the favorite lyric poets of modern times is Lermontoff (1814-'41), whose works have been translated into many languages. Pushkin and Lermontoff were beyond question the two most talented poets Russia has ever produced, and their works have exercised the most powerful influence on the mind of the young generation. Pushkin is the Byron of Russia, Lermontoff its Schiller. Other lyric poets of distinction are Viazemski (born 1792), a writer of elegies, and Gneditch, an excellent translator of the *Iliad*, "King Lear," and other foreign poems. Among the dramatic poets of distinction was Ozeroff (1770-1816), who was the first to fully comprehend the essence and objects of dramatic poetry. His tragedies ("Cedipus," "Fingal," &c.) are written in the Alexandrine verse; and although the language is not pure, and the structure of the verse is frequently heavy, these faults are fully outweighed by the vigor of thought and expression. Prince Shakhovski (died 1846) and Glinka are authors of many comedies. Among the more recent dramatic poets, Polevoi and Kukolnik, both of whom took the subjects of their dramas from Russian history, are the most important. Gogol (died 1852) in his comedies and novels pictured with great talent and intense sarcasm the provincial life of Russia. The historical novel has been cultivated with particular success by Bulgarin, who, however deficient his works may be from an æsthetical point of view, has the merit of having first ventured to portray actual life. Zagoskin, an imitator of Walter Scott, pictured the life of the lower classes, and Count Solohub that of the higher classes of St. Petersburg. Other distinguished writers in this branch of literature are Prince Odoyevski, Masalski, Senkovski, and Dahl. The idyllic life of the Cossacks was represented with great freshness and talent in the works of Gogol, Grebenka, and Kvitka, some of whom used the peculiar dialect of Little Russia (Ruthenian). Collections of popular tales and songs, to which in Russia as in all Slavic countries much attention is paid, were made by Novikoff, Maximovitch, Makaroff, and Sakharoff, and more recently by Afanasieff. Among the prominent historians are Ustrialoff, professor at St. Petersburg, whose "History

of Russia" (German translation, 3 vols., Stuttgart, 1840), which urges the gradual Russification of all the non-Russian tribes of the empire, has been officially introduced as a text book into the Russian colleges; Pogodin, the author of valuable critical works on the ancient history of Russia; Polevoi ("History of Russia"); and Danilevski, the author of some able though partial works on the wars of Russia with Napoleon I. Able historical investigations have also been made by Bestuzheff-Riumin, Sniegireff, Sreznevski, the academician Solovieff, and Arsenieff. Philosophical studies are still in their infancy, and mostly lean on modern German philosophy. Scientific theology is cultivated still less. A "Cyclopædia of Law" has been written by Nevolin, and a "History of Russian Law" by Moroshkin. As is the case with all despotic countries, Russia has a very stringent and annoying system of censorship, which has proved to be a great impediment to literature, yet at the same time a great promoter of it. All the writers of the 50 years preceding the accession of Alexander II. were turned into a kind of political martyrs. The independent study of sciences, the free culture of poetry, fiction, and the fine arts, were constantly checked, and despotism was rampant everywhere. The writers naturally strewed their pages with political allusions and recriminations, which exposed them to prosecution on the part of the government, causing their productions to be read by people who would not otherwise have taken any interest in them. In this way the progress of Russian literature since the accession of Nicholas to the throne in 1825 has been amazing. He began his reign amid a military revolution with which a few of the literary people were indirectly concerned. The leaders of the movement were hanged, and the others exiled to Siberia; but an impetus was given to liberal ideas which could not easily be checked. These ideas broke out again in 1848-'9 with Petrashevski's conspiracy. During that period Pushkin, Lermontoff, and Gogol were the leading writers, whom, moderate though they were in their views, the government never ceased to persecute. They were all exiled or banished at different times, but still went on with their liberal propaganda, embittered by the persecution and rendered immensely popular by their wonderful talents. Among those connected with the later revolutionary movements were two other young men, wealthy and well educated, Herzen (1812-'70) and Ogareff. They managed to escape to London, established there a Russian press, and began a series of publications of which the *Kolokol* ("The Bell"), a political newspaper, became the most celebrated. Russian travellers smuggled it into the empire in large quantities, and its fierce attacks on the government greatly contributed to awaken a feeling of patriotism among the more enlightened of the population. The Crimean war showed even to Nicholas that his system, far

from strengthening his empire, paralyzed its natural resources, and rendered worthless even the army, for which he had sacrificed everything else. When peace was concluded, and Alexander, who always had the reputation of a liberal and good-natured prince, ascended the throne, the progressive elements of the country naturally came to the front. Within less than five years after the conclusion of the peace of Paris, the party which consisted formerly of very moderate liberals, and never asked for anything beyond a reasonable amount of freedom of the press and public life, was transformed into ultra radicals. The teachings of modern materialistic philosophy, which had been rapidly gaining ground in western Europe, were eagerly adopted by the young generation of *littérateurs* and students, and within two or three years a school was formed, the radicalism of which outstripped anything that could be well imagined. Vogt, Moleschott, and Büchner became the theological and philosophical idols of the Russian youth; Fourier, Saint-Simon, Robert Owen, and Proudhon became their social teachers; and a system of cosmical, political, and moral conceptions was formed, which would have frightened the very writers whose authority it invoked. The disciples of this school were known as Nihilists, or believers in nothing. Its leaders were Tchernyshevski and Dobroluboff, and their organ was the *Sovremennik* ("The Contemporary"), a monthly magazine owned and ably edited by the poet Nekrasoff. It had speedily created a large party among the young men in the universities and public schools, and the spreading movement frightened the government, which prosecuted everybody who showed the slightest sympathy with it. All the conspiracies and political prosecutions which have taken place in Russia since 1862 have been connected with Nihilism. Among the prominent men of the party, besides Tchernyshevski, who was exiled to Siberia, and Dobroluboff, who died at the age of 26, were Pisareff (drowned by accident), Shelgunoff (exiled to Siberia), Mikhailoff (died in Siberia), Serno-Solovievitch (died in Siberia), and Pomialovski (died from overwork and excessive drinking at 23). The party is now considerably reduced. Whatever remains of it is under the leadership of Antonovitch and Zhukovski, two journalists of indifferent talent, but of more knowledge than their predecessors possessed. Foolish and extreme as are the views of that party, it has immensely contributed to the spread of knowledge throughout Russia. The works of Buckle, Huxley, Darwin, Tyndall, John Stuart Mill, Helmholtz, Virchow, and many others have been translated and passed through several editions. Some of the medical students (who joined the movement *en masse*) have made themselves favorably known all over Europe through their researches in physiology and biology. The movement did not exclude women, many of whom began to study medicine and natural

sciences, and took their degrees, mostly at the university of Zürich, as the doors of the Russian universities are still closed against them. Among the most celebrated of contemporary Russian authors are the romancists Ivan Turgeneff, Gontcharoff, Dostoyevsky, Avdeyeff, Count Tolstoi, jr., Krestovski, Khvostchinski, and Panayeff; the poets Nekrasoff and Polonski; and the dramatists Ostrovski and Count Tolstoi, sr. Prominent among editors of newspapers and periodicals are Aksakoff, Krayefski, Stasulevitch, Korsh, and Katkoff. The historical writers occupying the highest position are Solovieff, Pypin, and Kovalevsky. For statistical work the highest reputation has been achieved by Semenoff and Korsak. The great philosophical writer is Lavroff. As a matter of course, the chief literary centres are the two capitals, St. Petersburg and Moscow. The post office of St. Petersburg sends out to the provinces more than 80,000 copies of daily and 40,000 of weekly papers, and about 50,000 of monthly periodicals. The highest circulation of any one newspaper has not yet exceeded 25,000, but the number of publications is constantly increasing. The growth of Russian literature with such marvellous speed has prevented its being thoroughly studied abroad, and there are very few works on the subject which bring it down to the present day.—See Gretsch, *Essai d'une histoire de la littérature russe* (4 vols., St. Petersburg, 1819–22); Bowring, "Specimens of Russian Poets" (London, 1821); Otto, *Lehrbuch der russischen Literatur* (Leipsic, 1837; translated by Cox, Oxford, 1839); Jordan, *Geschichte der russischen Literatur* (Leipsic, 1846); Talvi (Mrs. Robinson), "Historical View of the Languages and Literature of the Slavic Nations" (New York, 1850); Khanikoff, *Études sur l'instruction publique en Russie* (Paris, 1865); and Petroff, "Sketch of Russian Literature" (French by Romald, Paris, 1872). Of late years many articles on Russian literature have appeared in foreign magazines, and especially in the Paris *Revue des Deux Mondes*.

RUSSIAN AMERICA. See ALASKA.

RUSO-TURKISH WAR. See supplement.

RUSTCHUK, a fortified town of Bulgaria, European Turkey, capital of the vilayet of Tuna ("province of the Danube"), on the right bank of the Danube, nearly opposite Giurgevo, 250 m. N. W. of Constantinople; pop. about 30,000. It is the seat of a Greek archbishop, and contains nine mosques, Greek and Armenian churches, and several synagogues. Silk, wool, cotton, leather, and other goods are made, and the trade has lately increased. Many engagements have taken place here during the past century between the Turks and the Russians. In 1810 it surrendered to the latter after a long siege. After evacuating the place in 1812 the Russians burned it, but it was soon rebuilt. The fortifications, razed after the treaty of Adrianople (1829), were rebuilt after 1853.

RUSTIGE, Heinrich von, a German painter, born at Werl, Westphalia, April 12, 1810. He

studied under Schadow in Düsseldorf, was a teacher at the Stadel institute in Frankfurt, and in 1844 became professor at the school of art in Stuttgart. He paints historical and genre pictures, as "The Gueux Sermon," "Raphael and the Fornarina," "The Recovered Child," "The Duke of Alva in the Castle of Rudolstadt," "The Funeral of the Emperor Otho III.," and "The Emperor Frederick II. and his Court at Palermo." He has published poetry and dramas, including *Attila* and *Ludwig der Baiern*, and a popular military song, *Deutscher Marsch*, set to music by Kücken.

RÜSTOW, Wilhelm, a German military writer, born in Brandenburg, May 25, 1821, died Aug. 28, 1878. He joined the army in 1838, and became an officer of engineers. He was indicted in 1850 for a publication on the military condition of Germany and fled to Zürich, where he became a teacher and major in the army. In 1860 he joined Garibaldi in Sicily, and afterward returned to Switzerland. In conjunction with Köchly he wrote *Geschichte des Griechischen Kriegswesens* (Aarau, 1852), and translations and commentaries relating to Greek military writers (2 vols., Zürich, 1854-'5). He also wrote on Julius Cæsar's military operations and Napoleon III.'s history of the same, on the first Napoleon's campaigns in Italy and Germany, on the Crimean war, and on the Franco-German war of 1870-'71. Prominent among his theoretical works are: *Die Feldherrnkunst des 19. Jahrhunderts* (Zürich, 1857; 2d ed., 1866); *Geschichte der Infanterie* (2 vols., Gotha, 1857-'8); *Allgemeine Taktik* (Zürich, 1858); *Militärisches Handwörterbuch* (2 vols., 1859; supplement, 1867); and *Strategie und Taktik der neuesten Zeit* (1872).—His brothers ALEXANDER and CÆSAR, Prussian officers, both killed in battle in 1866, were also authors of military works.

RUTA BAGA. See TURNIP.

RUTGERS COLLEGE, an institution of learning in New Brunswick, N. J., established by royal charter in 1770, under the name of Queen's college. It was connected with the general synod and theological seminary of the Protestant Reformed (Dutch) church till 1865, when it became an independent literary college, on the condition, however, that its president and three fourths of its trustees should be members in full communion of that church. It received its present name in 1825 in honor of Col. Henry Rutgers, who contributed \$5,000 to its fund. Previous to that time its exercises were thrice suspended, once by the revolutionary war and twice by financial embarrassments. The first president was the Rev. Dr. J. R. Hardenbergh, and the second the Rev. Dr. J. H. Livingston. The main college building was erected in 1809, through the efforts of the Rev. Dr. Ira Condict, president *pro tem*. The Rev. Dr. Philip Milledoler was president from 1825 to 1840, the Hon. A. B. Hasbrouck from 1840 to 1850, and the Hon. Theodore Frelinghuysen from 1850 to 1862. In consequence of its

small endowment and of the confusion of the civil war, the college was rapidly losing ground when the Rev. Dr. W. H. Campbell was appointed president in 1863. Under his administration several hundred thousand dollars have been added to its endowment; six new professorships have been created; a large geological hall, a chapel and library, an astronomical observatory, and a new grammar school building have been erected; and the number of students has increased from 60 to more than 200 now (1875) in actual attendance. In 1866 the state college of agriculture and the mechanic arts was opened as a department of Rutgers college, with a farm of 100 acres. In this department there are three courses of study, one in civil engineering, one in chemistry and agriculture, and a special course in chemistry, so arranged that either a two years' or a four years' course may be pursued, the latter being required for the degree of bachelor of science. Rutgers college has now 12 professorships, affording instruction in Biblical literature, constitutional law, military drill, agriculture, mining, metallurgy, analytical chemistry, engineering and graphics, and other branches common to American colleges. Its library numbers 7,000 volumes, and provision has been made for considerable additions. It has graduated 1,095 classical, 78 medical (from 1792 to 1816), and 71 scientific students, making a total of 1,244. The college has also a grammar school with nearly 200 pupils.

RUTH, Book of, one of the canonical books of the Old Testament. By many ancient and modern writers it has been regarded as an addition to the book of Judges, because the transactions which it relates happened in the time of the judges of Israel. (Ruth i. 1.) The book contains the history of Ruth, a Moabitish woman, who, after the death of her husband, a Hebrew emigrant from Judah, left her home, and followed her mother-in-law Naomi to Bethlehem, where Boaz, a relative of her deceased husband, attracted by her appearance as a gleaner in his field, married her. She was the mother of Obed, whose son Jesse was the father of David. The mention of comparatively late national customs (as in iv. 7), and the occurrence of Chaldaisms, are considered sufficient proofs that this book was composed in the times of the Hebrew monarchy. The alleged proofs of its composition long after the time of David, in the later Chaldee period of the language, are not conclusive, while there are clear indications of an earlier date. (See "Ruth, Book of," added to the American edition of Smith's "Bible Dictionary," p. 2755, and the authorities there referred to.) Christ's descent from Ruth (Matt. i. 5) is authenticated in this portion only of the Old Testament. Its canonical authority has never been questioned.—See Bertheau, *Richter und Rut* (*Exegetische Handbuch*, 1845); Keil, *Biblische Commentar*, *Josua*, *Richter und Ruth* (1863; translated in Clark's "Foreign and The-

ological Library," vol. viii.); Wright, "Book of Ruth, in Hebrew and Chaldee" (1865); Cassel, *Das Buch der Richter und Ruth* (in Lange's *Bibelwerk*, 1865); and Wordsworth, "The Holy Bible with Notes" (1865).

RUTHENIANS, or **Rusniaks** (Pol. *Rusini*, Hung. *Oroszok*), a branch of the Slavs, inhabiting E. Galicia and Bukowina, adjoining parts of Poland and West Russia, and N. E. Hungary. In Galicia and Bukowina they number about 2,500,000, and in Poland and Hungary about 500,000 each; in Russia they are generally classified with the Little Russians, to whom they are closely related. They are mostly agriculturists or graziers; in the Carpathian regions many are engaged in salt mining. Their language, which occupies a middle ground between Polish and Russian, is softer and more melodious than either. The prevailing religion is the United Greek in the Austrian territories, and Orthodox Greek in the Russian. The nobility is mostly Polonized. As a national element the Ruthenians are important only in Galicia, where they are antagonistic to the Poles, and where considerable efforts have been made to develop a Ruthenian literature, though as yet with insignificant results, and more recently to assimilate it to the Russian. The literary association *Halicko-Russka Matica* has been particularly active in the anti-Polish agitation. (See GALICIA, and SLAVIC RACE AND LANGUAGES.)

RUTHENIUM, one of the platinum group of metals, closely allied to osmium in many of its chemical relations. It was first observed by Prof. Osann in ores from the Ural mountains, and was named by him from Ruthenia (for Russia). It was afterward fully described by Prof. Claus, to whom the credit of the discovery is usually ascribed. The platinum ores of Russia, America, and Borneo contain it, and it has been detected by Wöhler in combination with osmium and sulphur in the mineral laurite found in Oregon and Borneo. To prepare ruthenium, Deville employs iridosmine, a refuse alloy from gold pen manufactories and assay offices. This alloy is fused with four or five times its weight of zinc in a carbon crucible; the heat is then raised sufficiently to volatilize all of the zinc, and the resulting mass is again fused with three parts of barium binocide and one part of saltpetre; the crucible is broken up, and its contents are treated with nitric and sulphuric acids. The oxide of ruthenium thus obtained is fused in a lime or magnesia crucible by means of the oxyhydrogen blowpipe. After osmium it is the most infusible of all metals, and it is only possible to melt small quantities in the hottest portion of the oxyhydrogen flame, at a temperature that would convert gold and platinum into vapor. The specific gravity of the fused metal is 11.4. Its symbol is Ru. It can be alloyed with other metals, such as zinc and tin, but is of no particular value as an alloy. Schönbein discovered that ruthenium in the form of sponge

would decompose water in the presence of chlorine. If some of the sponge be projected into chlorine water, oxygen gas is at once liberated and hydrochloric acid formed; the metal is not at all affected, and if chlorine were to be slowly conducted into the water, the liberation of the oxygen could be made continuous.

RUTHERFORD. **I.** A S. W. county of North Carolina, bordering on South Carolina and drained by the head waters of Broad river, a branch of the Congaree; area, about 850 sq. m.; pop. in 1870, 13,121, of whom 2,642 were colored. It has a hilly surface, and but a portion of the soil is fertile. The chief productions in 1870 were 24,406 bushels of wheat, 272,485 of Indian corn, 39,678 of oats, 26,474 of sweet potatoes, 122 bales of cotton, 13,119 lbs. of tobacco, 9,509 of wool, 77,609 of butter, 25,015 of honey, and 17,015 gallons of sorghum molasses. There were 1,142 horses, 747 mules and asses, 1,966 milch cows, 3,384 other cattle, 6,496 sheep, and 9,738 swine. Capital, Rutherfordton. **II.** A central county of Tennessee, intersected by Stone river, a branch of the Cumberland; area, about 550 sq. m.; pop. in 1870, 33,289, of whom 16,478 were colored. It has a diversified surface and a very fertile soil. It is intersected by the Nashville, Chattanooga, and St. Louis railroad. The chief productions in 1870 were 174,745 bushels of wheat, 867,443 of Indian corn, 63,514 of oats, 22,141 of Irish and 24,299 of sweet potatoes, 2,490 tons of hay, 23,285 lbs. of wool, 291,844 of butter, 8,412 bales of cotton, and 14,969 gallons of sorghum molasses. There were 7,953 horses, 3,493 mules and asses, 5,862 milch cows, 8,184 other cattle, 17,183 sheep, and 33,376 swine; 4 flour mills, 3 saw mills, and 4 wool-carding and cloth-dressing establishments. Capital, Murfreesboro.

RUTHERFORD, Lewis M. See supplement.

RUTLAND, a W. county of Vermont, separated from New York partly by Lake Champlain, and drained by Black, White, Quechee, and Paulet rivers, and Otter creek; area, about 1,000 sq. m.; pop. in 1870, 40,651. The surface is elevated, in some parts mountainous; soil fertile. Iron ore abounds, and a range of marble quarries extends along its whole length. The marble as well as the iron is excellent. It is intersected by several railroads, centring in Rutland. The chief productions in 1870 were 23,191 bushels of wheat, 180,780 of Indian corn, 246,092 of oats, 22,127 of buckwheat, 617,094 of potatoes, 110,624 tons of hay, 425,216 lbs. of wool, 1,190,645 of butter, 1,369,844 of cheese, 522,177 of maple sugar, and 25,504 of honey. There were 5,623 horses, 19,594 milch cows, 1,227 working oxen, 12,208 other cattle, 83,870 sheep, and 4,566 swine; 6 manufactories of agricultural implements, 2 of boats, 3 of boots and shoes, 19 of carriages and wagons, 8 of cheese, 11 of men's clothing, 13 of furniture, 2 of forged and rolled iron, 4 of castings, 14 of leather, 4 of machinery, 13 of marble and stone work, 6 of tombstones, 1 of

lead and zinc, 1 of slate pencils, 28 of roofing materials, 1 of scales, 15 of tin, copper, and sheet-iron ware, 2 of woollen and 1 of worsted goods, 38 saw mills, and 14 flour mills. Capital, Rutland.

RUTLAND, a town and village, county seat of Rutland co., Vermont, on Otter creek, at the junction of the Rutland, the Harlem Extension, the Rutland and Washington, and the Rensselaer and Saratoga railroads, 50 m. S. S. W. of Montpelier; pop. of the town in 1850, 3,715; in 1860, 7,577; in 1870, 9,834, of whom 2,963 were foreigners. The village (pop. in 1875, about 9,000) is built in the valley of the creek near the centre of the town, and is the second place in importance in the state. It is pleasantly situated between two lines of hills, the Green mountain range on the east and the Taconic range on the west. The Clarendon springs are 6 m. distant, and there are several prominent peaks in the vicinity. The village is laid out at right angles. The business blocks are of brick and marble; the residences principally of wood. The public buildings (of brick) are the post office and United States court house, the county court house, and the town hall. There are three large brick hotels; three national banks, with an aggregate capital of \$1,000,000; a savings bank, with about \$700,000 deposits; two daily and weekly newspapers, one of which, the "Herald," was established in 1794; and ten churches. The town is divided into 18 school districts, including the graded district in the village, having 25 school buildings, with 60 teachers and 2,300 pupils. There are several private schools, including the Rutland military institute, with 100 students. There are no large manufactories. The production of marble is the chief industry, employing about 1,500 men. The annual yield is about 400,000 cubic feet. The quarries, first opened about 1840, are the largest and most valuable in the state, furnishing large and sound blocks of white marble quite as fine as the statuary marble of Carrara. Beautiful specimens of variegated and brecciated marble are also found.—The town was chartered in 1761 and settled in 1770. A centennial celebration was held in October, 1870. It was one of the capitals of the state from 1784 to 1804. The village was incorporated in 1847.

RUTLANDSHIRE, an inland county of England, bordering on Lincolnshire, Northamptonshire, and Leicestershire; area, 149 sq. m.; pop. in 1871, 22,070. The scenery is beautiful, and the soil fertile. It is the smallest county in England, and is remarkable for its wheat and cheese; but barley is the principal production. The chief town is Oakham.

RUTLEDGE. **I. John**, an American statesman, of Irish parentage, born in Charleston, S. C., in 1739, died there, July 23, 1800. He studied law in London, returned to Charleston in 1761, and attained the foremost rank as an advocate. He was a member of the stamp act congress at New York in 1765, of the South

Carolina convention in 1774, and in the same year a delegate to the continental congress at Philadelphia. He was reappointed to the congress of 1775; and in 1776, in the convention of South Carolina, he was chairman of the committee which prepared the constitution, and was elected president of the new government. When Fort Moultrie was attacked by the British in June, he sent to it 500 lbs. of powder, against the advice of Gen. Lee, and directed Col. Moultrie not to evacuate it without an order from him. In 1779 he was chosen governor, and when Charleston was threatened with a siege he was clothed by the legislature with dictatorial power. In May, 1780, when Charleston fell, Rutledge retired to North Carolina, and for nearly two years accompanied the southern army. In 1782 he was elected to congress, and in 1784 chosen chancellor of the state; and he was a member of the convention for framing the federal constitution, the ratification of which he supported in the state convention. In 1789 he was appointed an associate judge of the United States supreme court, and in 1791 elected chief justice of South Carolina. He was appointed chief justice of the United States in July, 1795, and presided at the succeeding term of the supreme court; but the senate, for political reasons, refused to confirm the appointment. **II. Edward**, a signer of the Declaration of Independence, brother of the preceding, born in Charleston, Nov. 23, 1749, died Jan. 23, 1800. He studied law in London, practised in Charleston, and in 1774-'7 was a member of the continental congress. In June, 1776, he was a member of the first board of war, and in September was associated with Dr. Franklin and John Adams as a committee to confer with Lord Howe on Staten island as to terms of accommodation. In 1779 he was again appointed to congress, but was prevented by illness from taking his seat. During the siege of Charleston in 1780 he was taken prisoner and detained for 11 months at St. Augustine. In the legislature of 1791 he drew up the act for the abolition of the rights of primogeniture. From 1798 till his death he was governor of the state.

RÜTLI. See GRÜTLI.

RUTULI, a Pelasgian people of ancient Italy, on the coast of Latium, whose chief town, Ardea, became a Roman colony about 490 B. C. In Virgil, King Turnus of the Rutulians is mentioned as an enemy of Latinus, who gave his daughter Lavinia, previously promised to Turnus, in marriage to Æneas. Their name disappears after the time of the Roman kings.

RUYSDAEL, **Jacob**, a Dutch painter, born in Haarlem about 1630, died there in November, 1681. He abandoned his original profession of surgery and rose to great distinction as a landscape and marine painter. The figures in some of his pictures were executed by Ostade, Wouvermans, Berghem, and others.

RUYSSSELEDE, a town of West Flanders, Belgium, 14 m. S. S. E. of Bruges; pop. about

7,000. It is the seat of a celebrated reformatory, which was opened by the government in 1849. Although under one direction, it is divided into three distinct schools, two for boys at Ruyselede and Wynghe, near each other, and one for girls at Beernem, about two miles distant. The children received are vagrants, truants, street beggars, and the like, not properly criminals, but in danger of becoming so. The age of admission is from 7 to 18 years; the term of committal is during minority; the average stay is about three years, some going away in three months, while others remain eight or ten years. The institution is conducted on the congregate plan, the boys sleeping in large dormitories. The principal labor is farm work on 240 acres, including a kitchen garden of 19 acres, with a large stock of horses, cows, sheep, and hogs, and model farm buildings. In winter various trades are carried on. The wool and flax grown on the farm are spun, woven, and made up into garments; the straw is plaited and made into hats; and the hides are tanned and shoes made. Even the table beer is brewed on the farm. The institution is not only entirely self-supporting, including the expenses of administration, but in 1871 there was a net profit of 3,000 francs, and in the previous four years a total gain of 10,000 francs. In August, 1872, there were 522 boys at Ruyselede. At Wynghe there were 50 boys in training for a seafaring life, but also working on the farm and in the shops. The reformatory at Beernem, opened in 1853, contained in August, 1872, about 250 girls, chiefly employed in lace making, sewing, and laundry work. They are in charge of a religious sisterhood, but under the general superintendence of the director at Ruyselede. The girls gain in proportion to their number more than the boys, their earnings amounting to 100,000 francs a year. From 1849 to 1873 about 5,000 boys had been received. The present director, Eugene Poll, believes that substantially all the children sent to Ruyselede are saved, as the percentage of those who turn out badly is almost zero.

RUYTER, Michael Adriaenszoon de, a Dutch admiral, born in Flushing, Zealand, in 1607, died in Syracuse, Sicily, April 29, 1676. He was apprenticed by his parents to a shoemaker at the age of 11 years, but ran away and engaged as cabin boy, and gradually rose to the highest rank. When in 1641 Holland undertook to assist Portugal against Spain, De Ruyter, then rear admiral, commanded the Dutch fleet. In 1647 he attacked and sunk an Algerine squadron of four times his own number of vessels off the port of Salé. In 1652, England and Holland being at war, while convoying a fleet of merchantmen, he met the English fleet off Plymouth, and repulsed it, saving his entire convoy. During the next two years he commanded a division of the Dutch fleet under Admiral Van Tromp, and fought two naval battles, one of which was successful. In 1655

he was again sent against the Algerine pirates, whom he chastised terribly, hanging at the yardarm the famous renegade, Armand de Diaz. In 1659 he was sent to the assistance of Denmark against Sweden, and for his services the Danish king ennobled him and his whole family. In 1665, war having again broken out between England and Holland, he was put in command of the fleet, but Prince Rupert confined him to the Dutch coast. In June, 1666, he gallantly fought the English for three days in the Irish sea, but eventually withdrew. In 1667 he renewed the attack, ascended the Thames as far as the Medway, burned the shipping at Sheerness, and compelled England to sign a treaty of peace at Breda. In 1671 De Ruyter was put in command of the fleet in the war against France and England, and in 1672 fought the combined fleet long and obstinately, but without decisive results. In 1675 he was sent to the Mediterranean to aid the Spaniards against the French, and in 1676 fought a desperate battle against a greatly superior French force under Admiral Duquesne off the E. coast of Sicily, and was finally worsted, and retreated with his fleet into the harbor of Syracuse. He lost both legs in the fight, and died of his wounds.

RYCAUT, Sir Paul. See **RICAUT**.

RYE, a cereal grain, *secale cereale*, much cultivated in temperate climates. The genus *secale* belongs to the subtribe of grasses with wheat and barley (*hordeineæ*) in which the inflorescence is in a dense spike, the spikelets being sessile at the joints of a zigzag rachis; the chief botanical difference between rye and wheat is that in the former the spikelets are only two-flowered, with the abortive rudiment of a third flower, while in wheat the spikelets have three to several perfect flowers; the lower palets of the flowers of rye are long-awned, and the grain is brown. As with other cultivated grain, the origin of rye is uncertain; De Candolle thinks the evidence points to the country between the Alps and the Black sea as its native region. It appears to have varied less under cultivation than any other grain, there being only two recognized varieties, the winter and spring, produced as with wheat by the manner of cultivating; it succeeds upon a much poorer soil than wheat, and is well suited to those light sandy soils which will profitably produce neither wheat nor barley. The cultivation of rye does not differ from that of wheat; it is sown in September, at the rate of one to two bushels to the acre; it is sometimes sown among Indian corn, the seed being covered with a cultivator or hoe, leaving the surface as level as possible; the corn is cut as soon as ready and removed to one side of the field, and the rye thoroughly rolled. The straw of rye is often of more value than the grain, and hence great care is taken of it in harvesting; it is frequently cut with the cradle, and in order to keep the straw unbroken thrashed with a flail; the straw is

in demand for bedding, bringing a good price in cities; it is used for making straw mats for covering hotbeds and other garden uses, for stuffing horse collars, and other mechanical purposes. As a green fodder crop rye is valuable; the herbage after it is well established may be pastured late in autumn, and in early spring it affords succulent and nutritious food, which may be cut for cows from the time it is six inches high until the head is formed, when the stems become dry and useless. Rye is held in but little favor in England, its cultivation being confined to some of the northern counties, while on the continent it is largely used, and in some localities is the common breadstuff of the population; its color is less pleasant than that of wheat, the bread made from it has a very dark color, and its taste and odor are to some disagreeable; it is capable of making a light wholesome bread, though less nutritious than that of wheat, as



Rye (*Secale cereale*).—Head reduced, and single Spikelet enlarged.

the grain contains from 2 to 3 per cent. less of nitrogenous principles. It was formerly the custom in England to sow two or three parts of wheat with one of rye, the grains being harvested and threshed together; the mixture, called maslin or meslin (Lat. *miscel-lanea*), is said to be better when thus grown together than can be made from the grains grown separately; bread from maslin is regarded as more nutritious than that from the poorer kinds of wheat. Rye meal is an ingredient in the New England brown bread, the other ingredient being an equal or larger amount of Indian corn meal. The Swedish peasantry subsist largely upon rye cakes, which are thin flat disks with a hole in the centre by means of which they are strung upon sticks to dry; they are baked only twice a year, and must be dried thoroughly. Rye is somewhat laxative, and a mush made from the meal is a suitable food for those troubled with con-

stipation. The roasted grains have long been used as a substitute for coffee. Rye is used in Russia to distil a spirit called *quass*; in Holland it is employed together with malt to make gin; and in this country much whiskey is made from it. The grain is sometimes attacked by a minute fungus which causes it to change its form and grow into a horn-like body several times larger than the grain itself, and known as spurred rye; where this occurs great caution should be observed in using the grain for food, as it is highly poisonous. (See *ERGOT*.)—The total production of rye in the United States, according to the census of 1870, was 19,918,795 bushels. The states producing the largest quantities were: Pennsylvania, 3,557,641 bushels; New York, 2,478,125; Illinois, 2,456,578; Wisconsin, 1,325,294; Kentucky, 1,108,933; Ohio, 846,890; Virginia, 582,264; New Jersey, 566,575; Missouri, 559,532; and Kansas, 505,807.

RYE GRASS. See DARNEL.

RYERSON, Adolphus Egerton, a Canadian clergyman, born near Victoria, Upper Canada (now Ontario), March 24, 1803. After being a teacher, he was ordained deacon in the Methodist church in 1825, and for four years was an itinerant minister. In 1829 he became editor of "The Guardian," the official Methodist newspaper; in 1832, 1836, and 1840 was a delegate to the British conference; and in 1842 became principal of Victoria college at Cobourg. In 1844 he was appointed superintendent of public schools for Upper Canada, and in 1849 submitted a plan for the organization of the public school system, which was adopted. He is now (1875) chief superintendent of education for Ontario. He has published a history of Canada, and has prepared a treatise on the "United Empire Loyalists," who emigrated from the United States to British America in 1783.

RYLAND, John, an English clergyman, born in Northampton, Jan. 29, 1753, died in Bristol, May 25, 1825. He was the son of the Rev. John Collett Ryland, Baptist pastor at Northampton and afterward principal of a seminary at Enfield, author of "Contemplations on the Beauties of Creation," &c. (3 vols.), and other works. The son could read the Psalms in Hebrew at five years of age, and had read through the Greek Testament before he was nine. In 1770 he preached before the Baptist congregation of Northampton, and for the next five years assisted his father in his school, and preached occasionally. In 1776 he became pastor of the Northampton congregation. In 1791 he wrote the circular letter which led to the formation of the English Baptist missionary society, in the organization of which he took part at Kittering in 1792. In 1793 he was called to Bristol as pastor of the Baptists in that city and president of the Baptist college, continuing in both offices for nearly 33 years. In 1815 he was chosen secretary of the Baptist missionary society. He published

many sermons and several volumes on theological topics.

RYLE, John Charles. See supplement.

RYMER, Thomas, an English antiquary, born in Yorkshire about 1640, died in London, Dec. 14, 1713. He was a member of Gray's Inn and historiographer to King William, and was chosen to edit the whole body of existing documents relating to state transactions between England and other countries. The result was the collection entitled *Fœdera, Conventiones, Literæ et cujuscumque Generis Acta Publica inter Reges Angliæ et alios quosvis Imperatores*, &c., commonly called "Rymer's Fœdera;" 15 volumes were printed before Rymer's death, and Robert Sanderson, who was appointed his assistant in 1707, published the remainder (together 20 vols. fol., 1704-'35). Rymer wrote a play entitled "Edgar, or the English Monarch" (1678), and "A Short View of Tragedy of the Last Age," with reflections on Shakespeare and "other Practitioners for the Stage"

(1693); and left several volumes in manuscript on the history and government of England, which are in the British museum.

RYSWICK (Dutch, *Ryswyk* or *Rijswijk*), a village of the Netherlands, in the province of South Holland, 2 m. S. E. of the Hague; pop. about 2,900. A treaty of peace was concluded here in 1697 by Louis XIV. of France on the one part and the German empire, England, Spain, and Holland on the other, which terminated the long war that followed the league of Augsburg in 1686. By that treaty Louis acknowledged William of Orange as king of Great Britain and Ireland, and restored his conquests in Catalonia, and a large part of Flanders to Spain, and others on the Rhine, as well as Lorraine, to the German empire; but Strasburg and other places in Alsace were definitively ceded to France. The villa where the treaty was concluded was demolished in 1783, and a commemorative pyramid was erected on the spot in 1792.

S

S THE 19th letter, 15th consonant, and chief sibilant in the English alphabet. It is a linguo-dental, and represents the hissing made by driving the breath between the end of the tongue and the roof of the mouth, just above the upper incisors. It is found in most languages, and is one of the most abundant consonants in English. Its sound varies, being strong, like *c* soft, in *this, sun*, and softer, like *z*, in *these, wise*. Among the Hebrews, the tribe of Ephraim uttered *s* for the aspirated *sh*, which they could not articulate (Judg. xii. 6); and lisping, which is not uncommon, especially in children, consists in uttering the aspirated *th* for *s*. Its symbol in Hebrew signifies tooth, and in its original shape it may have represented three teeth, since in Hebrew, Greek, and Etruscan it consists of three strokes, which in altered positions have the same relative situation to each other. In the Phœnician the angles are rounded, and approach the serpentine form of the Roman character.—In words common to the Greek and Latin, the latter language often has an *s* initial in place of the aspirate in the former; thus *ἔξ, ἑπτά, ἥλιος, ἵδωρ, ὕλη, ὕς*, become *sex, septem, sol, sudor, sylvæ, sus*. Before words borrowed from the Latin having *s* initial, the French often prefix a vowel; thus *spiritus, spatium, spes*, become *esprit, espace, espérance*; and by an abbreviation *schola, scribere, status*, become *école, écrire, état*. In the middle of words the dropped *s* is replaced by a circumflex (Λ); thus *tempestat, magister, bestia, epistola*, become *tempête, maître, bête, épître*; and the Italian *medesimo, testa, presto*, become *même, tête, prêt*. In modern English, French, Spanish, and Portuguese, *s* final is the usual sign of the plural of nouns. In some

declensions of Greek, Latin, and the Teutonic languages (in English in all substantives singular) it serves to mark the genitive. It is subject to interchanges with *t* (Ger. *das* and *dass, Fuss, gross, Biss*, Eng. *that, foot, great, bite*), *th* (*loves, loveth, hates, hateth*), *z* (in the Somersetshire dialect of England; Dutch *zuster, zomer*, Eng. *sister, summer*), *sch* (Ger. *schlagen*, Eng. *slay*), and other consonants.—As an abbreviation it stands for *societas* or *socius*, for the proper name *Sextus*, anciently for the numeral 7, for *solo* in Italian music, and for south in books of navigation and geography.

SAADI, Sheikh Moslih ed-Din, a Persian poet, born in Shiraz, died in 1291, at the age of 102, or according to some authorities at a still higher age. He studied at Bagdad, became a dervish, made 15 pilgrimages on foot to Mecca, travelled in India and Egypt, and fought against the crusaders in Syria, where he was taken prisoner. A merchant of Aleppo ransomed him and gave him his daughter in marriage, with whom he led an unhappy life. After 30 years' wanderings, he returned to Shiraz and built himself a hermitage, where he passed his remaining years. He possessed great scientific knowledge, and was familiar with the principal oriental languages and Latin. His collected productions include the *Gulistan* ("Flower Garden"), *Bostan* ("Fruit Garden"), *Pend Nameh* ("Book of Counsels"), numerous gazels or odes, elegies, &c. The whole, in Persian and Arabic, edited by Harrington, were printed at Calcutta in 1791 (2 vols. small fol.); and of the *Gulistan* editions have been published with a parallel English translation by James Dummoulin (Calcutta, 1807), and with a vocabulary by Eastwick (Hertford, 1850), who translated

it into English prose and verse (1852). The *Gulistan* has been translated into German by Olearius (Schleswig, 1654) and Graf (Leipsic, 1846); and into French by Gaudin (Paris, 1791), Semelet (1828; 2d ed., 1834), and Charles De-frémery (1858). (See PERSIA, LANGUAGE AND LITERATURE OF, vol. xiii., p. 323.)

SAADIA (or **Saadiah**) **BEN JOSEPH**, a Jewish writer, born in Egypt in 892, died in Babylonia in 941 or 942. He became the leading teacher (*gaon*) at the great school of Surā in Babylonia in 928. His principal work is "Religions and Doctrines," written in Arabic, and now generally known under its title *Emunoth v'edebth* in Judah ben Tibbon's Hebrew translation (German translation by Fürst, Leipsic, 1845). He translated the Hebrew Scriptures into Arabic, and wrote in Hebrew didactic poems on the laws and history of the Jews.

SAARBRÜCK, or **Saarbrücken**, a town of Rhenish Prussia, 40 m. S. E. of Treves, on the Saar, which here becomes navigable; pop. in 1871, 7,686. A bridge connects the town with the suburb Sanct-Johann (pop. 9,143). There are Catholic and Protestant churches, and a palace, once the residence of the princes of Nassau-Saarbrück. The town is an important centre of the coal trade, the adjoining mines producing in 1871 upward of 60,000,000 quintals and employing about 15,000 persons. Saarbrück was bombarded by the French, under Gen. Frossard, on Aug. 2, 1870, in the presence of Napoleon III., who reported that his son there received the "baptism of fire;" but four days afterward the French, intrenched on the Spichern heights, were defeated by the Germans.

SAARDAM, or **Zaandam**, a town of the Netherlands, in the province of North Holland, at the junction of the Zaan with the Y, 5 m. N. W. of Amsterdam; pop. in 1867, 12,341. It is surrounded by hundreds of windmills, some of them of enormous size, used for grinding corn, and for making oil and paper. Peter the Great of Russia worked here in disguise as a ship carpenter for a short time in 1697, and the house where he lived was bought by the late queen of Holland, a sister of Alexander I., who had a marble tablet placed over the chimneypiece. The celebrated ship yards have almost all disappeared.

SAAVEDRA, **Ángel de**. See **RIVAS**.

SAAVEDRA Y FAXARDO, **Diego**. See **FAXARDO**.

SABA. See **ARABIA**, vol. i., p. 620, and **SHEBA**.

SABEANS. See **SHEBA**.

SABAISM (Ar. *tzaba*, to rise in splendor, as a star; Heb. *tzeba hashshamayim*, the host of heaven, the stars, *tzebaoth*, the heavenly host), the name given to the worship of the heavenly bodies as deities. It prevailed in antiquity, under various forms, in large parts of western Asia, was kindred to the element worship of the Persians and other nations, gave rise to astrology, and in Mesopotamia maintained itself to a late period. Arabian historians speak of it as the oldest religion in the world, and

Palgrave finds many traces of it in modern Arabia. According to one tradition, it was handed down from Enoch; according to another, from Sabai, son of Seth, son of Adam. Ibn el-Wardi mentions two Sabian works, a book of prayers and the "Book of the Law," which were attributed to Enoch.

SABBATH (Heb. *shabbath*, day of rest), the name of the seventh day of the week among the Hebrews, dedicated to an entire cessation from worldly labor. It began on Friday evening, and extended to the evening following. Whether it was instituted by Moses or was of ante-Mosaic origin is disputed. A wilful violation of the sabbath was punished with death. In later times the provisions of the Mosaic law respecting the sabbath were greatly extended by the Jews; travelling was forbidden, and only "a sabbath day's journey" (2,000 paces beyond the limits of one's town or village) allowed. In the time of the Maccabees many zealous Jews permitted themselves to be slaughtered by the enemy rather than defend themselves on the sabbath. Christ reproached the sect of the Pharisees for the stress they laid on a mere external strictness in observing the sabbath without corresponding purity of heart and life. The Mishnah enumerates 39 principal sorts of business which must not be performed on the sabbath, and each of them has again its subdivisions. Stated meetings for worship seem not to have been connected with the sabbath until after the exile. The sabbath before the passover was called the great sabbath. Every seventh year was called the sabbatical year, in which the fields remained uncultivated and debts could not be collected. The great majority of the Christian churches celebrate the first day of the week, Sunday, instead of the seventh (sabbath); but a few small denominations, as the Seventh Day Baptists, the adherents of Joanna Southcote, &c., maintain that the change was made without Scriptural warrant, and therefore adhere to the religious celebration of the seventh day. There is also a small sect of Sabbatarian Christians in Transylvania. (See **LOEP'S DAY**.)

SABELLIANS. See **SABELLIUS**.

SABELLIUS, the originator of the doctrine described in the history of the church as Sabellianism. He was a native of Africa, a presbyter of Ptolemais, a city of the Libyan Pentapolis, and lived about the middle of the 3d century. The doctrine of Sabellius, so far as it can be gathered from the fragments preserved in the writings of his opponents, differed from the Patristic tenets of Noëtus and Praxeas. They held that the divine in Christ was God or the Father, who became and was called the Son only when he willed to become incarnate. Sabellius taught that the Logos or Word existed before the incarnation, but not as a distinct person, being immanent in the essence of the Deity as the divine reason. He was regarded as therein differing from St. John in the fourth gospel,

denying that the Logos, the creating, revealing, and redeeming principle, is a person really and eternally distinct from the Father. Wishing to preserve the revered Scriptural terms of "Father, Son, and Holy Ghost," used by the old Monarchians and by Christians generally, Sabellius rejected the ecclesiastical conception of these terms, as involving a trinity of distinct personal existences in the Godhead, and opposed to the prevailing theology a trinity of manifestations or offices. God in himself, according to Sabellius, is one and personal; but this one divine person, subsisting in the absolute simplicity of the divine nature, becomes Father, Son, and Holy Ghost, according as he shows himself in creating, redeeming, and sanctifying mankind. Thus God, remaining ever one, shows himself in three ways. These three historic forms are not persons in the Deity, but aspects of it. The titles are contingent, as the offices which they represent are temporary; the manifestations cease when the work of the Son and the Holy Ghost is accomplished, both being reabsorbed in the absolute Deity. The most conspicuous opponent of Sabellius, through whom indeed his views and those of his party are best known, was Dionysius of Alexandria. In his controversy with Dionysius of Rome, while pointing out sharply the distinction between the Son and the Father which Sabellius denied, he went so far as to expose himself to the charge of denying their unity of nature. His hostility did not prevent the Sabellian opinion from finding partisans. Epiphanius, in the 4th century, says that the Sabellians were to be found in considerable numbers, not only in Mesopotamia, but in the neighborhood of Rome. The council of Constantinople, in 381, by rejecting their baptism, testified to their importance. Augustine, a few years later, believed them to be extinct; but their opinions continued to flourish under other names. Marcellus and Photinus, in the 4th century, were only the first of a long line of eminent teachers who have sustained after Sabellius the theory of a trinity of offices rather than a trinity of persons in the Godhead.—The doctrine of Sabellius is very fully discussed in the various histories of dogmas, especially by Martini, Möhler, Baur, Meier, Dörner, and by Schleiermacher in his treatise on the opposition between the Sabellian and the Athanasian theory of the Trinity.

SABINE, a river which rises in Hunt co. in N. E. Texas, runs S. E. about 250 m., when it reaches the E. boundary, and then generally S. with a curve to the east, separating Texas and Louisiana, and enters Sabine lake near the coast, the entire length being about 500 m. It has no large tributaries, and is navigable only in some parts, and that for very small vessels.—Lake Sabine lies between Texas and Louisiana, about 5 m. from the gulf of Mexico, with which it communicates by Sabine pass. It receives the waters of the Sabine and Neches rivers, and is about 18 m. long by 9 m. broad.

SABINE. **I.** A W. parish of Louisiana, separated from Texas by the Sabine river, and drained by several of its tributaries, among which are the bayous St. Patries, San Miguel, Lennau, and Tureau; area, about 1,300 sq. m.; pop. in 1870, 6,456, of whom 1,847 were colored. It has a nearly level surface and fertile soil. The chief productions in 1870 were 74,520 bushels of Indian corn, 15,032 of sweet potatoes, and 2,350 bales of cotton. There were 736 horses, 1,521 milch cows, 5,022 other cattle, 1,512 sheep, and 9,091 swine. Capital, Manny. **II.** An E. county of Texas, separated from Louisiana by the Sabine river; area, 525 sq. m.; pop. in 1870, 3,256, of whom 1,107 were colored. It has an undulating surface covered with forests, and a very fertile soil. The chief productions in 1870 were 86,839 bushels of Indian corn, 19,680 of sweet potatoes, 1,722 bales of cotton, 1,766 lbs. of wool, and 1,918 gallons of molasses. There were 831 horses, 1,634 milch cows, 983 working oxen, 4,120 other cattle, 1,598 sheep, and 10,640 swine. Capital, Hemphill.

SABINE, Sir **Edward**, a British physicist, born in Dublin in October, 1788. He was educated in the military schools at Marlow and Woolwich, entered the royal artillery in 1803, became captain in 1813, served in the war with the United States, commanding the batteries in the siege of Fort Erie in 1814, and in 1818–19 accompanied Ross and Parry in their first arctic expedition. In 1821 he began a series of investigations in terrestrial physics in several voyages from the equator to the arctic circle. In these investigations, the results of which were published in 1825, he determined the requisite length of the pendulum to beat seconds in different latitudes, and thus laid the basis for an accurate determination of the figure of the earth. In 1838 he presented a memoir on the magnetic isoclinical and isodynamic lines of the British islands, and published "Variability of the Intensity of Magnetism upon Many Parts of the Globe." His discoveries led to the establishment of permanent magnetic observatories in Great Britain and the colonies, the latter under his superintendence, and from 1840 to 1860 he published the results of magnetic observations at the Cape of Good Hope, Hobart Town, St. Helena, and Toronto, in several 4to volumes. He has been a fellow of the royal society since 1818, was vice president from 1850 to 1861, and president from November, 1861, to November, 1871, when he resigned. He was made a knight of the bath in 1869, and general in 1870.

SABINE, **Lorenzo**, an American author, born in Lisbon, N. H., Feb. 28, 1803, died in Boston, Mass., April 14, 1877. He had been a merchant and bank officer, and was for some time secretary of the Boston board of trade. He was three times elected to the Maine legislature from Eastport; was an agent of the United States treasury department in Massachusetts; and was a member of congress from that state

in 1852-'3. He published a "Life of Commodore Preble" (1847); "Biographical Sketches of the Loyalists of the American Revolution" (1847; enlarged ed., 2 vols. 8vo, 1864); a "Report on American Fisheries" (1853); "Notes on Duels and Duelling" (1855); and an "Address on the One Hundredth Anniversary of the Death of Gen. Wolfe" (1859).

SABINES, an ancient people of Italy, embracing a large number of tribes conspicuous in the legends and history of Rome. They formed three principal groups: the Sabines proper; the Sabelli, divided into Vestini, Marsi, Marrucini, Peligni, Frentani, and Hirpini; and the Samnites. They were migratory, and early spread over the central and southern regions of the peninsula. They were renowned for bravery, rustic simplicity of manners, love of freedom, and religious character. In peace they were ruled by republican magistrates, in times of war by sovereign commanders, called by the Roman historians dictators or kings. The Sabines proper, the least warlike of all, inhabited a mountainous district in the central Apennines, between the rivers Tiber, Nar (now Nera), and Anio (Teverone), and surrounded by Latium, Etruria, Umbria, Picenum, and the territories of the Sabellians and Samnites. Their principal towns were Amiternum on the Aternus (Pescara), Cures, the birthplace of Numa Pompilius, Reate (Rieti) on the Nar, Nursia (Norcia), and Nomentum. The Sabines formed one of the constituent elements of the Roman people, a portion of them having become incorporated, according to the legend, with the subjects of Romulus on the termination of the war waged to revenge the rape of the Sabine women by the Roman youths. The remainder of the people continued independent, but early in the 3d century B. C. received the full Roman franchise and were finally merged in the republic.

SABLE, a carnivorous animal of the weasel family, and genus *mustela* (Linn.), of which the generic characters have been given under FISHER; it is the *M. zibellina* (Linn.). In size



Sable (*Mustela zibellina*).

it is about equal to the pine marten (see MARTEN), and its color in summer is brownish, with white spots on the head and grayish neck; in winter it is much darker, though not so dark as to justify the use of its name as an epithet signifying deep blackness. The feet are hairy

to the toes, indicating its residence to be a snow-covered region; it inhabits the frozen mountains of European and Asiatic Russia, where its chase is attended by great hardships on account of the severity of the climate and the barren nature of the country. The dark winter fur is highly esteemed, and forms an important article of commerce to the Russians; considerable numbers are carried to Russia and western Europe, where they bring almost fabulous prices, a single skin being worth from \$20 to \$60; the hairs are so soft that they will lie any way in which they are placed. It lives principally in trees, lying concealed during the day and hunting by night; it will destroy a hare, though larger than itself, and kills ermines and other small weasels; it may be tamed, and is very docile if taken young. It is by some regarded as a variety of the pine marten (*M. martes*, Linn.); but, though not uncommon, enough specimens do not exist in museums to determine the question. It has from three to five young, late in March or early in April. The American sable is the American pine marten (*M. Americana*).

SABLE ISLAND (Fr. *sable*, sand), a low island in the Atlantic ocean, about 100 m. S. E. of Nova Scotia, to which it belongs; length about 25 m., breadth from 1 to 5 m. It consists of two nearly parallel ridges of sand joined at the ends, which enclose a lake about 11 m. long and in some places 12 ft. deep. There are two kinds of grass, wild peas, strawberries, cranberries, &c. The island supports about 500 wild horses, and some horned cattle. There are valuable fisheries in the vicinity. Many fatal shipwrecks have occurred upon Sable island and the sand banks and shoals which surround it. An establishment for the relief of persons thrown upon its shores is supported by the Dominion of Canada. In 1871 the population consisted of five families, comprising 27 persons, connected with this establishment. In 1873 the government established two lighthouses, one at the W. end (lat. 43° 57' N., lon. 60° 8' W.), with a revolving light 123 ft. above the sea, and the other 1½ m. from the E. end (lat. 43° 58' 30'', lon. 59° 46'), with a fixed light 128 ft. above the sea.

SAC, a W. county of Iowa, watered by Boyer and Coon rivers and other streams; area, 576 sq. m.; pop. in 1870, 1,411. The surface is rolling and the soil fertile. The chief productions in 1870 were 37,090 bushels of wheat, 42,267 of Indian corn, 38,831 of oats, and 30,120 lbs. of butter. Capital, Sac City.

SACAPA. See ZACAPA.

SACCATOO. See SACKATOO.

SACCHINI, Antonio Maria Gasparo, an Italian composer, born in Pozzuoli about 1735, died in Paris, Oct. 7, 1786. He was educated under Durante, produced numerous works in Italy and Germany, and arrived in 1772 in England, where he remained till 1784, when he established himself in Paris. His operas, once famous over Europe, are now scarcely

known by name even, notwithstanding they are skilfully and richly harmonized and abound in beautiful melodies. The most celebrated in their day were *Il Cid*, *Tamerlano*, *Montezuma*, *Rinaldo*, and *L'Amore soldato*, composed for the London opera house, and *La colonie*, *L'Olympiade*, and *Œdipe à Colonne*. The last named, his best work, was brought out at Paris the year after his death.

SACHEVERELL, Henry, an English clergyman, born in Marlborough, Wiltshire, about 1672, died in London, June 5, 1724. He was educated at Oxford, obtained a fellowship, received holy orders, and in 1705 was appointed preacher of St. Saviour's, Southwark. In 1709 he delivered two political sermons, the one at the Derby assizes on Aug. 15, the other before the lord mayor at St. Paul's on Nov. 5, in which he maintained the doctrine of passive obedience, and denounced the act of toleration. These sermons were widely circulated by the opponents of the existing government. The whigs being then in power under the ministry of Godolphin, Dr. Sacheverell was ordered to be impeached; and the trial commenced before the house of lords, Feb. 27, 1710. On March 23 he was found guilty, sentenced to three years' suspension from preaching, and the two sermons were ordered to be burned by the common hangman. This light sentence was considered a tory victory, and the excitement created by the affair contributed to the fall of the whig ministry. At the expiration of his sentence the house of commons, then led by tory influences, appointed him to preach before them on the restoration day, and the queen presented him to the living of St. Andrew's, Holborn. Bishop Burnet says: "He possessed little of religion, virtue, learning, or good sense;" and he was afterward seldom heard of except through his quarrels and law-suits with his parishioners.

SACHS, Hans, a German poet, born in Nuremberg, Nov. 5, 1494, died in January, 1576. He was a cobbler, and was instructed in singing and verse making in Munich by Lienhart Nunnenbeck, a *Meistersinger*. He produced, it is said, 6,000 poems of all kinds, about one fourth of which only are in print. These include 53 sacred and 78 profane plays, 64 farces, and 59 fables. Many of his dramatic pieces are brief comedies called *Schwänke*, full of coarse, strong satire on the times. Since the appearance in 1570-'79 of the collective edition of his works in 5 vols. fol., and the reprint in 1612-'17 in 5 vols. 4to, several editions of selections from them have been published, the latest forming vols. iv., v., and vi. of the collection of *Deutsche Dichter des 16. Jahrhunderts*, by Goedeke and Tittmann (8 vols., Leipzig, 1870-'72; new ed., 1874). He was called "honest Hans Sachs." A monument was erected to him in Nuremberg in 1874.

SACKATOO, or *Sokoto*. I. A Foolah monarchy of central Africa, in Soodan, E. of the Niger and N. of the Benooe, and largely identical

with the territories of Houssa except in its western provinces. Inclusive of the tributary state of Adamawa or Fumbina on the south-east, it extends from about lat. 6° 30' to 14° N., and from lon. 5° to 15° E., and is bounded N. by the Sahara, N. E. and E. by Bornoo and Baghirmi, S. by unexplored regions, and W. by Gando. Its estimated area, including Adamawa, is about 170,000 sq. m., and it forms a portion of the extensive region conquered by the Foolahs, who, although they have been the dominant race since about 1800, constitute but a minority of the entire population, which is estimated by Behm at 12,000,000, though other authorities make it much smaller. The surface of the country is very uneven. The higher portions are dry and generally barren, but the valleys are extremely fertile. The climate of the northern portion is salubrious, except in the valleys during the rainy season. The productions are iron of very good quality, cotton, rice, tobacco, and sorghum. Sheep, cattle, horses, asses, and camels are raised. The sultan, a descendant of the Foolah chief Othman, resided at Wurno, 15 m. from the city of Sackatoo, when Barth visited the country in 1853. His income at that time was reckoned at £10,000 in shell money, with an equal amount annually in slaves and cloth. Sackatoo has been a somewhat noted field of African exploration, having been visited by Clapperton, Lander, Richardson, and Barth. (See ADAMAWA, FOOLAHS, and HOUSSA.) II. A city and former capital of the above described country, situated on a long ridge sloping toward the Sackatoo or Rima river, a tributary of the Niger, in lat. 12° 59' N., lon. 5° 12' E.; pop. more than 20,000. Its name, according to Clapperton, signifies "a halting place." It is laid out in the form of a square, each side of which is about 1½ m. long, and is surrounded by a wall upward of 12 ft. high. Eight gates are indicated on Barth's map, two on each side of the city. An important market is held here, at which an extensive traffic is carried on in slaves, horses, cattle, leather, iron, and articles of food. The principal industry is the manufacture of leather goods, including bridles, bags, cushions, and many other articles, which are celebrated in central Africa for their excellent quality and fine workmanship. Sackatoo has been rendered particularly prominent in the record of African travel by the death of the British explorer Clapperton in its vicinity in 1827.

SACKBUT, a wind instrument of the trumpet species, capable of being drawn out to different lengths, and probably identical with the modern trombone, which is said to have been modelled by the Italians from an ancient one excavated at Pompeii, and which on its first introduction into England was called a sackbut.

SACKETT'S HARBOR (or more correctly SACKETT's), a village in the town of Hounsfield, Jefferson co., New York, on the S. shore of Black River bay, an inlet of Lake Ontario, at the terminus of the Utica and Black River railroad,

10 m. W. S. W. of Watertown; pop. in 1875, 734. The harbor, one of the best on the lake, is divided by a crescent-shaped tongue of land, which extends from the lower part of the village, into the outer and inner harbor. The latter has sufficient depth of water for large vessels to within two fathoms of the shore. Its commerce, formerly extensive, has been mostly diverted to other channels. The Madison barracks, built by the government in 1816-'19, at a cost of \$85,000, are situated here.—In the war of 1812 Sackett's Harbor was the headquarters of the northern division of the American fleet, and several war vessels were built and expeditions fitted out here. It was twice attacked by the British, who were repulsed, the last time with a loss of 150 men.

SACKVILLE. **I. Thomas**, earl of Dorset, an English statesman, born at Buckhurst, Sussex, in 1536, died in London, April 19, 1608. He was educated at Oxford and Cambridge, was called to the bar, was elected to the house of commons, and was created Baron Buckhurst in 1567. In 1570 he was sent as ambassador to France; in 1587 he was ambassador to the Netherlands; and from 1599 till his death he was lord treasurer. In March, 1603, he was created earl of Dorset. He planned the "Mirror for Magistrates," a collection of rhymed stories from English history by different authors, and produced the earliest known tragedy in the English language, "Gorboduc," or "Ferrorex and Porrex," played before Queen Elizabeth in 1562. His works were edited by the Rev. Sackville West in J. R. Smith's "Library of Old Authors" (London, 1859). **II. Charles**, sixth earl of Dorset, born Jan. 24, 1637, died in Bath, Jan. 16, 1706. He was a wit, and a favorite of Charles II., and William III. appointed him lord chamberlain. His best composition was the song written before a naval engagement with the Dutch admiral Opdam, beginning "To all you ladies now at land."

III. George, a soldier and statesman, first Viscount Sackville, son of the first duke of Dorset, and grandson of the preceding, born Jan. 26, 1716, died Aug. 26, 1785. He entered the military service as Lord George Sackville, was present at the battles of Dettingen and Fontenoy, served under the duke of Cumberland against the young pretender, and rose to the rank of lieutenant general. At the battle of Minden, Aug. 1, 1759, he commanded the allied cavalry, and for his failure to execute the commander-in-chief's order to charge the retreating French infantry, he was court-martialled and dismissed from the service. George II. struck his name from the list of privy councillors; but on the accession of George III. he was again taken into favor. In 1775, under the name of Lord George Germain (assumed in compliance with a will), he entered the cabinet of Lord North as secretary of state for the colonies, retaining the office during the American revolutionary war, and incurring great unpopularity by his opposition to efforts for

the termination of hostilities. In February, 1782, the king created him Viscount Sackville.

SACO, a river of New England, rising in the White mountains, in Coös co., N. H., and formed by the junction of three principal branches at Bartlett, Carroll co. It flows S. E. until it enters Maine, then makes an abrupt turn N., and again pursues a S. E. direction through that state to the ocean below Saco. The main branch passes through the noted Notch of the White mountains. Its falls afford valuable water power. The principal of them are the Great falls, at Hiram, 72 ft.; Steep falls, at Limington, 20 ft.; Salmon falls, at Hollis and Buxton, 30 ft.; and Saco falls, 42 ft. This last fall is about 4 m. from the mouth of the river, and is at the head of tide water. The river has an ordinary rise in the spring of from 6 to 15 ft., but it has frequently very far exceeded that height, causing destructive inundations. The entire length of the river is estimated at 160 m.

SACO, a city, port of entry, and one of the shire towns of York co., Maine, on the E. bank of the Saco river, about 4 m. from its mouth, and on the Portland, Saco, and Portsmouth, and the Boston and Maine railroads, 13 m. S. W. of Portland; pop. in 1870, 5,755. It is connected with Biddeford, an active and thriving city on the opposite side of the river, by four bridges. The sea beach within the city (the part of which called Old Orchard beach is $3\frac{1}{4}$ m. from the railroad depot) has unsurpassed facilities for driving and bathing, and has several hotels. It has little foreign commerce, but a considerable coasting trade. The number of vessels belonging to the port on June 30, 1874, was 23, aggregate tonnage 3,766. Ship building is carried on. A few vessels and boats are engaged in the cod and mackerel fisheries. Cotton goods, cotton machinery, boots and shoes, belting, brick, brushes, carriages, hubs and wheels, loom harnesses, lumber, and leather are manufactured. There are two national banks, with a joint capital of \$200,000; two savings banks, with about \$1,500,000 deposits; a fire insurance company, a weekly newspaper, an Athenæum with a library of 2,000 volumes, and Baptist, Christian Congregational, Episcopal, Freewill Baptist, Methodist, and Unitarian churches.—Saco was separated from Biddeford as Pepperellboro' in 1762. The name was changed in 1805, and in 1867 a city charter was obtained.

SACRAMENT (Lat. *sacramentum*, the military oath or its obligation), in Christian theology, an external ordinance or rite of divine institution, significant of a supersensual grace or spiritual effect. Its earliest usage in the Old Italic version of the New Testament and in the Latin Vulgate means something sacred and hidden, and *sacramentum* is thus taken as an equivalent for the Greek *μυστήριον*, a secret; hence the early church fathers used the word to denote any mysterious doctrine or thing pertaining to the Christian belief or worship.

Subsequently *sacramentum* in the Latin church and *μυστήριον* in the Greek were restricted to certain rites or ordinances divinely instituted for imparting to the recipient an invisible grace in conformity with the visible ceremony. Both these churches believe that there are seven such sacraments, viz.: baptism, confirmation, penance, the eucharist, extreme unction, order or ordination, and matrimony. Baptism, confirmation, and order can only be received once, and are considered to impress on the soul an indelible seal or character. Baptism and penance are called "the sacraments of the dead," because ordained by Christ to restore the soul dead by sin to the life of sanctifying grace. Baptism is validly conferred on infants without the exercise of reason; but its worthy reception by the adult requires faith in the redeeming merits of Christ and compunction for past offences. The five other sacraments are called "sacraments of the living," because the first requisite condition for their worthy reception is, that the soul of the recipient should be in a state of sanctifying grace.—In the church of England many distinguished theologians, especially in recent times, have inclined to the opinion that there are in the Christian church two primary and five secondary sacraments. The majority, however, with Protestants generally, believe in but two sacraments, baptism and the Lord's supper, on the ground that the New Testament mentions only these two as having been instituted by Christ. The "Apology" for the Lutheran confession of Augsburg mentions also penance or "absolution" as a true sacrament; but this was afterward omitted from the list of the sacraments, and confession was retained by the Lutheran churches as a mere ecclesiastical institution. The sacrament of ordination has also found advocates among modern High Lutherans. A violent controversy about what constitutes the substance of each sacrament was carried on between the Lutherans and the Reformed churches in the 16th century. As to the efficacy or operation of the sacraments, a wide difference of opinion has existed between Protestant and Roman Catholic theologians, arising in a great measure from the widely different meaning applied by the disputants to the term "faith," and to other interior dispositions required of the recipient of the sacraments. The Friends regard the rites of baptism and the Lord's supper as Jewish customs which ceased to be obligatory after the apostolic age. The Dunkers, Mennonites, Winebrennarians, and others, consider the "washing of feet" and the Lord's supper as coördinate and of equal obligation.

SACRAMENTO, a river of California, draining with the San Joaquin the central valley of the state. It rises on the southern slope of Mt. Shasta, in lat. 41° 25' N., and runs principally S. 370 m. to its mouth in Suisun bay, which communicates through San Pablo and San Francisco bays and the Golden Gate with the

Pacific ocean. It is navigable to Sacramento, about 80 m. from Suisun bay, by vessels drawing 3 ft. of water, and to Tehama, 180 m. further, by steamboats drawing 15 in. The chief tributaries are the Pitt, Feather, and American rivers, all coming in from the eastward. Pitt river is longer and larger than the Sacramento at the junction, and is named on some of the maps, but not in common usage, the Upper Sacramento. It rises in the N. E. corner of the state, and in wet seasons is the outlet of Goose lake, the basin of which extends into Oregon.

SACRAMENTO, a central county of California, bounded N. by the American river, S. by the Calaveras and San Joaquin, and W. by the Sacramento, and intersected by the Mokelumne and Cosumnes rivers; area, 1,026 sq. m.; pop. in 1870, 26,830, of whom 3,596 were Chinese. It has a diversified surface, nearly level in the west and hilly toward the east, and the soil is generally fertile. The E. portion contains deposits of gold. It is traversed by the Central Pacific and other railroads. The chief productions in 1870 were 126,135 bushels of wheat, 62,280 of Indian corn, 589,513 of barley, 72,055 of Irish and 148,920 of sweet potatoes, 74,797 gallons of wine, 515,213 lbs. of wool, 319,500 of hops, 439,835 of butter, 88,050 of cheese, and 21,827 tons of hay. There were 9,462 horses, 9,050 milch cows, 13,149 other cattle, 113,304 sheep, and 14,749 swine; 2 manufactories of bags, 4 of boots and shoes, 6 of brick, 5 of carriages and wagons, 10 of men's clothing, 4 of confectionery, 4 of cooperage, 5 of furniture, 2 of gas, 5 of malt liquors, 3 of machinery, 2 of engines and boilers, 10 of saddlery and harness, 2 of sash, doors, and blinds, 5 of tin, copper, and sheet-iron ware, 1 of woollen goods, and 3 flouring mills. Capital, Sacramento.

SACRAMENTO, a city and the capital of California, county seat of Sacramento co., the second city in the state in population and importance, 83 m. by the California Pacific railroad and 139 m. by the Central Pacific railroad E. N. E. of San Francisco; lat. 38° 33' N., lon. 121° 20' W.; pop. in 1850, 6,820; in 1860, 13,785; in 1870, 16,283, of whom 6,202 were foreigners, including 1,370 Chinese; in 1875, locally estimated at 24,000, of whom 2,000 were Chinese. It is situated in an extensive plain on the E. bank of the Sacramento river, here spanned by a fine bridge, immediately S. of the mouth of the American river, and is one of the handsomest cities W. of the Rocky mountains. The streets are wide and straight, and cross each other at right angles. Those running E. and W. are named by the letters of the alphabet; those crossing them N. and S. are numbered. The shops and stores are mostly of brick, the dwellings mostly of wood and surrounded by gardens. Shade trees are abundant. The streets in the business portion are paved with Nicolson pavement and cobblestones. The city is supplied with gas, and water is pumped

up from the Sacramento river, and distributed through the streets in pipes. The climate is semi-tropical, and a luxuriant growth of flowers and shrubs may be seen in the open air at all times of the year. The only important public building is the state capitol, one of the finest structures of the kind in the United States. It is situated almost in the heart of the city, and the grounds cover 18 blocks, beautifully laid out with trees, shrubs, and flowers. The Oregon division of the Central Pacific railroad, which runs to Redding, 170 m. N., connecting by stage coaches with the Oregon and California railroad for Portland, Or., brings to Sacramento a vast amount of trade from N. California, embracing the best grain-growing section of the state. The Placerville and Sacramento Valley railroad, extending to Shingle

three banks incorporated under state law, combining a savings and commercial business, and a national gold bank. There are 19 public schools (1 high, 1 grammar, 5 intermediate, and 12 primary), a female college, and a normal school; a Roman Catholic college, under the charge of the Christian brothers; a conventual school, under the charge of the sisters of mercy; and a number of private schools. The state library in the capitol has more than 35,000 volumes, and the Sacramento library, in a fine building belonging to the association, about 7,000. The state agricultural society has ample accommodations for the exhibition of stock and one of the finest race courses in the world. It holds a fair annually about the middle of September. Three daily, two semi-weekly (one German), and two weekly newspapers and a

monthly periodical are published. There are 14 churches, viz.: Baptist (3), Christian, Congregational, Episcopal, German Lutheran, Latter Day Saints', Methodist (3), Presbyterian, Roman Catholic, and Spiritualist.—The first white settlement on the site of Sacramento was made in 1839 by J. A. Sutter, a Swiss by birth, but a naturalized American citizen, who obtained a grant of 11 square leagues of land, in 1841 built a fort which he called New Helvetia, took the neighboring Indians into his service, collected a few white men, and, by virtue of his remote position and the number of his adherents, secured influence and importance in the territory.



State Capitol of California.

Springs, El Dorado co., 48 m., brings immense quantities of bowlders and granite for the San Francisco market, and also of marble from the Indian Diggings quarries. This is the only marble of any consequence yet discovered on the Pacific coast; it is of fine quality, and is extensively used in San Francisco and Sacramento. Steamers run to San Francisco, Marysville, and various points on the Sacramento river. The chief manufactories are one of agricultural implements, one of carriages, one of brandy, one of beet sugar, two of chicory, one of furniture, one of pails, tubs, and wash boards, several box factories and planing mills, smelting and refining works for the reduction of ores, a woollen mill, and three flouring mills. The machine, repair, and car shops, rolling mills, &c., of the Central Pacific railroad employ from 1,000 to 1,500 hands. There are

This fort was the first point in California reached by immigrants crossing the continent. In 1848 nearly all persons going to the mines went up the Sacramento river in boats to New Helvetia, and thence proceeded by land. With the increase of the mining population and the gold yield the trade and importance of New Helvetia kept pace, and in October, 1848, there was an auction sale of lots in the town of "Sacramento," which was first named in the advertisement of the sale. In January, 1849, the first frame house on the bank of the Sacramento was commenced. The site of the city was originally only about 15 ft. above low-water mark, and as the river frequently rises 20 ft. it was subjected to overflow. In January, 1850, in March, 1852, and in January, 1853, the city was flooded so that boats were used in

going from house to house, some of the streets having 5 ft. of water in them, and not more than a dozen houses being on land above the water level. To prevent similar disasters the streets were filled in 5 ft. deep with earth, and the city surrounded by a levee, which last alone saved the place from overflow during the flood in the spring of 1861. The business portion of the city is now about 8 ft. above the original level. On Nov. 3, 1852, a conflagration destroyed 600 houses and other property, in all estimated to be worth \$5,000,000; and in July, 1854, another large fire occurred, the loss by which was estimated at \$650,000. The capital was established at Sacramento by an act of the legislature on Feb. 25, 1854; and in 1861 the work was commenced on the capitol, the officers having previously occupied the present county buildings. Sacramento was incorporated as a city in 1863.

SACRED HEART, *Ladies of the*, a religious congregation in the Roman Catholic church, devoted to education, founded in Paris, Nov. 21, 1800. Two fruitless attempts to establish a society of women devoted to the education of young ladies of the higher classes had been made by Père de Tournely, when in 1800 his successor, Joseph Désiré Varin, superior of the Fathers of the Faith, found in Madeleine Sophie Louise Barat and Octavie Bailly persons fitted for his design; and on Nov. 21 they consecrated themselves to the Heart of Jesus, and opened a school in Paris. In 1801 they went to reside in Amiens, where their community as well as their pupils increased rapidly in number. In 1802 Mme. Barat, then in her 21st year, was chosen superior, and a temporary rule was drawn up by Père Varin. Branch establishments were founded, and in 1806 a first chapter of the order was held, at which Mme. Barat was chosen superior general, which post she retained till her death in 1865. The ladies of the Sacred Heart were placed under the control of a secular priest, who, by an attempt to change their rules, created a division among them. This checked their growth for a brief space; but the innovations being discountenanced in Rome, Père Varin completed his draught of the proposed constitutions in 1825, and they were approved by Leo XII., Dec. 22, 1826. The pope at once invited the ladies to open a house in Rome, assigning them the convent and church of Trinità de' Monti. They spread thence to the chief cities of Italy, and soon owned flourishing schools in Austria, Bavaria, Prussia, Belgium, England, and Ireland. They had come to the United States in 1817, with Bishop Dubourg of New Orleans, and founded a house near St. Louis, Mo.; but their increase in this country is chiefly due to the late Archbishop Hughes, to Mme. Elizabeth Gallitzin, and especially to Mme. Aloysia Hardey, who founded most of the American houses. They opened successfully a school at the corner of Houston and Mulberry streets, New York, then at As-

toria, and finally at Manhattanville. In 1842 Mme. Hardey founded establishments in the Pottawattamie missions, and at McSherrystown, Md. Thenceforward the order spread to the principal states of the Union, and to the Canadian provinces, Cuba, and Chili.—The rules and constitutions are closely modelled on those of the society of Jesus, in all that regards the conditions for membership, the careful and long training for the final profession, the degrees which obtain among the members, the election of the superior general and the appointment by her of all inferior officers, the distribution of the entire body into assistancies and provinces, the rigorous obedience and poverty practised by the sisterhood, and the effective methods used to maintain the religious spirit among them. But, beyond the mere fact of the instrumentality of Père Varin in founding this society, there is no dependence on the Jesuits and no connection between the two societies. The members employed in the higher functions of teaching and governing are designated as "choir religious," the others as lay sisters. In 1875 the order had in France 8 provinces and 42 establishments, including one in Algiers; the province of Belgium and Holland, with 4 establishments; that of England and Ireland, with 5; that of Italy, with 5; that of Spain, with 3; and that of Austria, with 5. In America, they had in the United States 3 provinces with 21 houses, the province of Canada with 5, and the province of Chili with 5, besides an establishment at Havana. The number of choir religious was 2,325, and that of lay sisters 1,947; total, 4,272. The central house of the whole order and the residence of the superior general is in the boulevard des Invalides, Paris.

SACS, or **Sanks**, an Algonquin tribe of Indians, formerly on the Detroit river and Saginaw bay, but driven beyond Lake Michigan by the Iroquois. They settled near Green bay, where they subsequently welcomed the Outagamies or Foxes, with whom they have ever since been closely associated. They were roving and restless, were constantly at war with the Sioux and the Iroquois, and aided the French against the latter. A part of the tribe at first joined the Foxes in their hostility against the French at Detroit, but soon abandoned their cause. They took part with Pontiac, and during the revolution were under English influence. In the second war with England the Rock river Sacs joined the English side. Treaties were made specially with the tribe in 1804 and 1815-'16, ceding lands. Their later history is that of the Foxes. (See **FOXES**.) The Sacs were divided into a great number of clans, the Great and Little Bear, Great and Little Fox, Wolf, Owl, Eagle, Tortoise, and four others. The children of each family as they are born are marked white or black alternately, and each color forms a distinct band in the nation, the white or Kiscoquah and the black or Oshkosh. When

Black Hawk with the British band of Sacs began war in 1832 to recover the ceded lands on Rock river, Keokuk, chief of the Kiscoquah band, a great warrior and negotiator, remained faithful. The united Sacs and Foxes numbered 8,000 in 1822, but were reduced in 1874 to 1,135, of whom 338 were in Iowa, 97 in the Great Nemaha agency, Nebraska, 200 in Kansas, and 500 in Indian territory.

SACY. **I. Antoine Isaac Sylvestre de**, baron, a French orientalist, born in Paris, Sept. 21, 1758, died there, Feb. 21, 1838. After studying law, he devoted himself to oriental languages, and published in 1793 his *Mémoires sur diverses antiquités de la Perse*. He became in 1795 professor of Arabic at the oriental academy, in 1806 professor of Persian at the collège de France, and in 1815 rector of the university of Paris. Many of the most distinguished orientalist of the period were among his pupils. He was also politically active, espousing the side of the royalists. His principal works are: *Chrestomathie arabe* (3 vols., 1806); *Grammaire arabe* (2 vols., 1810); *Nouveaux aperçus sur l'histoire de l'écriture chez les Arabes* (1827); *Anthologie grammaticale arabe* (1829); and *Exposé de la religion des Druses* (2 vols., 1838). He published annotated editions and translations of several oriental writers, a valuable catalogue of his own library, and memoirs on minor subjects of oriental literature, history, and numismatics. **II. Samuel Ustazade Sylvestre de**, a French author, son of the preceding, born in Paris, Oct. 17, 1801. After practising law, he became a prominent writer in the *Journal des Débats* as an opponent of Charles X. (1828-'30), and as a supporter of Louis Philippe (1830-'48). After the *coup d'état* of Dec. 2, 1851, he wrote chiefly on literary subjects. He was also keeper of the Mazarin library from 1836 to 1848, and subsequently its administrator. In 1854 he was elected to the academy, and in 1864 became a member of the council of education, and in 1867 of the senate. Among his works are *Variétés littéraires, morales et historiques* (2 vols., 1858; 2d ed., 1861), and editions of various authors, including *Lettres de Madame de Sévigné* (11 vols., 1861-'4).

SADDUCEES, the name of a Jewish sect, derived according to a Jewish tradition from Zadok, its reputed founder, in the 3d century B. C.; but Epiphanius derives it from the Hebrew word *tsaddik* (just), and says that the followers of the sect assumed this name. The Sadducees appear in history for the first time under the Maccabæan Jonathan, about 144 B. C. They acknowledged only the written law, rejecting the obligatory character of all traditions, and, according to Josephus, held that the soul dies with the body, denied providential interference, and made all human actions, with their good and evil results, solely dependent on the free will of men. In comparison with their opponents both in the religious and the political sphere, the more austere and pop-

ular Pharisees (see PHARISEES), the sect was never numerous, but it was highly influential, as it mostly recruited itself from the educated and wealthy classes, and for a long time held the high-priestly office in its control. Toward the close of the existence of the Jewish state the Sadducees were excluded from Judaism, and gradually disappeared; but some of their principles were revived by the sect of Caraites.—See Grossmann, *De Philosophia Sadducæorum* (Leipsic, 1836), and Wellhausen, *Die Pharisäer und die Sadducæer* (Greifswald, 1874).

SADI. See SAADI.

SADLER, Sir **Ralph**, an English statesman, born in Hackney, Middlesex, in 1507, died at Standon, Hertfordshire, March 30, 1587. Henry VIII. employed him in the dissolution of the religious houses, and he shared in the spoils. Between 1537 and 1543 he was sent on several diplomatic journeys to Scotland. In 1547 he distinguished himself at the battle of Pinkie, and was knighted. The king named him in his will one of 12 councillors to the 16 nobles to whom the care of the kingdom was intrusted. On the accession of Mary he retired to his estate near Hackney. When Elizabeth came to the throne he was called into the privy council, and on the imprisonment of Mary queen of Scots in the castle of Tutbury, he was appointed her keeper. After the execution of Mary he was sent to Scotland to pacify King James.—See his "State Papers and Letters," edited by Arthur Clifford, with a memoir and notes by Walter Scott (Edinburgh, 1809).

SADLIER, **Mary Anne** (MADDEN), an American authoress, born at Cootehill, county Cavan, Ireland, Dec. 31, 1820. She began contributing to a London magazine when scarcely 18. Having emigrated to Montreal, she published by subscription "Tales of the Olden Time." In 1846 she married James Sadlier, then of the firm of D. and J. Sadlier and co., Catholic publishers of New York and Montreal, since deceased; she now (1875) resides in New York. She has written a great number of tales, among which are: "The Daughter of Tyreconnell" (1863); "Con O'Regan" (1864); "Heiress of Kilorgan" (1867); "MacCarthy More" (1868); and "Maureen Dhu" (1870). She has also translated several religious works, tales, and dramas from the French.

SADO, an island of Japan, a few miles W. of the main island, between lon. 138° and 140° E., intersected by the 38th parallel of N. latitude; length 40 m., general breadth about 8 m.; pop. about 130,000, chiefly miners. The surface is mountainous, and the soil indifferent. Sado is noted for its gold mines, discovered in the 17th century and continuously worked since then. The entire island is a mass of auriferous rock, though the deposits are not extremely rich. The mines, mostly in the E. part, furnish lead, silver, copper, and gold. The rude native processes have recently been superseded by foreign machinery supervised by American miners. The average annual yield

for many years was 500 lbs. of gold and 700 lbs. of silver. The chief harbor is Ebisuminato.

SADOLETO, Jacopo, an Italian ecclesiastic, born in Modena, July 14, 1477, died in Rome, Oct. 18, 1547. In 1502 he went to Rome, became attached to the household of Cardinal Oliverio Carafa, and was ordained a priest. In 1511 he entered the service of Cardinal Fregosio, was elected member of the Roman academy, and published several Latin poems. Leo X. on his accession in 1513 chose him as one of his secretaries, and he distinguished himself by avoiding all offers of wealth, associating with Gaetano of Tiene and Giovanni Pietro Carafa (afterward Pope Paul IV.) in public benevolence. In 1517 he was appointed bishop of Carpentras in France. In the controversies between Luther and the Roman theologians, Sadoletto was urged to act as mediator, but conciliated neither party. The correspondence that he then began with Erasmus is thought to have prevented the latter from openly joining the reformers. During the reign of Adrian VI. he was neglected and lived in obscurity. Clement VII. in 1523 appointed him his secretary. When Clement had declared for France against the emperor Charles V., Sadoletto withdrew to his diocese, ten days before the sack of Rome by the Spanish troops (1527). In 1536 he published in Venice a commentary on St. Paul, offering a middle ground between the extreme opinions on grace and free will. This was followed by *Hortensius, sive de Laudibus Philosophiæ* (Lyons, 1538; last ed., Paris, 1853, with a French translation). He was now made a cardinal, and bent all his energies toward effecting reforms and winning back those who had embraced the Lutheran doctrines. In his own diocese he successfully resisted the spread of Calvinism, while he besought the clemency of Francis I. in favor of the Waldenses of Mérindol and Cabrières, and protected them against the ruthless oppression of the Toulouse magistrates. In the same conciliatory spirit he wrote a famous letter to the magistrates and citizens of Geneva; and his treatise *De Extructione Ecclesiæ Catholicæ* is almost the only instance of a passionless discussion in the religious literature of that age. He was sent by Paul III. in 1542 as legate to Francis I., to effect a reconciliation between him and the emperor. Failing in this, and grieved to see the pope sacrificing the highest interests of the church to the promotion of his own family, he retired to Carpentras and resigned his bishopric. The pope compelled him to go to Rome in 1546, and he was chosen to preside in the council of Trent as papal legate, but resisted the appointment on the score of his extreme poverty. His collected works, except the letters, were published at Verona (4 vols. 4to, 1737-'8); his letters, *Epistolarum Libri XVII.*, appeared at Lyons in 1550 (best ed., including the letters and Latin poems of Paolo Sadoletto, his nephew and successor as bishop of Carpentras, 5 vols. 8vo, Rome, 1759

-'67). His life, by Fiordibello, was published with a new edition of his treatise on education, *De Libris recte Instituendis* (Paris, 1855). See also Joly, *Étude sur Sadolet* (Caen, 1857).

SADOWA, a small village in Bohemia, on the Bistritz river, 8 m. N. W. of Königgrätz, and 58 m. E. N. E. of Prague. It was the scene of the decisive battle, July 3, 1866, between the Prussians commanded by King William I. and the Austrians under the command of Benedek, often called the battle of Königgrätz. The Prussian armies had two days before effected their junction. More than 400,000 men were engaged in this action, which lasted from 8 A. M. till 4 P. M., and resulted in the total rout of the Austrians, who lost 40,000 killed and wounded, 20,000 prisoners, and 174 guns. The Prussian loss was estimated at 10,000. The great difference in the losses of the two armies was mainly due to the greater rapidity of fire and longer range of the needle gun used by the Prussians. This battle decided the double German-Italian war of 1866.

SAFE, a strong box or closet for the preservation of money, valuable papers, &c., usually made of iron, and as nearly proof against fire and burglars as possible. Until the present century the most usual safes were boxes of oak or other hard wood, strengthened by iron bands and provided with several locks. The first English patent for a fire-resisting safe was to Richard Scott in 1801. It consisted of an inner and an outer casing of metal, the space between being filled with charcoal or wood treated with an alkaline salt. The first American safes that attained any celebrity were those constructed under the patent of C. J. Gayler, issued in 1833. They were double chests with spaces between them for air, or other good non-conductors of heat. The great fire in New York of 1835 gave rise to several new inventions for increasing the fire-proof quality of safes. That patented by Mr. B. G. Wilder of New York obtained the precedence, and the safes made on this plan are still in extensive use in this country and in Europe. They consist of a double box of wrought-iron plates strengthened at the edges with bar iron, and in the larger sizes with a bar across the middle. The space between the outer and inner plates is filled with the patented composition of plaster of Paris and mica. The use of asbestos with plaster of Paris has also been patented. The latter answers a very good purpose used alone, and other good incombustible non-conductors also employed for filling are clay, hydraulic cement, and a mixture of alum, fire clay, and carbonate of lime or chalk. An excellent filling is a mixture of alum and plaster of Paris. Within a few years great ingenuity has been employed in the construction of safes and locks, and it has become an important industry in the United States. Safes are now made to defy opening by any manipulation (see Lock), and there are devices which make it difficult or impossible for a burglar

to introduce gunpowder without consuming a long time in boring. A contrivance to prevent boring has been patented by Mr. Henry Geering of Birmingham, England, which consists in placing in front and on each side of the lock a set of movable cylindrical steel bars, so that when the burglar's drill has penetrated through the outer plate it cannot get a bearing upon the rotating bars.

SAFETY LAMP. See LAMP.

SAFFI, or **Asfi**, a seaport of Morocco, on the W. coast, S. of Cape Cantin, 75 m. N. by E. of Mogador; pop. about 10,000. It is surrounded by a massive wall 30 ft. high, with a ditch on the land side. The country around it is sterile, and water is scarce. The harbor is large and generally safe, but is exposed to W. winds. Before the rise of Mogador Saffi controlled most of the commerce of Morocco with Europe. The entries at the port in 1873 were 180 vessels, of 35,376 tons; value of cargoes, \$568,590, of which \$300,000 was in specie; clearances the same, value \$1,388,140. The principal exports are grain, beans, eggs, goat skins, wool, oranges, and slippers.—Saffi is on the site of the Portus Rhusibis of Ptolemy, supposed to have been built by the Carthaginians. It was held by the Portuguese and Spaniards from 1508 to 1641.

SAFFLOWER, a dyeing material, the florets of *carthamus tinctorius*, also called bastard and dyer's saffron, and in this country, incor-



Safflower (*Carthamus tinctorius*).

rectly, saffron. The genus *carthamus* (from *kartam* or *quortom*, the Arabic name of the plant) belongs to that tribe of *compositæ* which includes the thistles, and contains about 20 species, the most important being the safflower; this is an annual, which has been so long cultivated in the East that its native country is unknown; it is from 1 to 3 ft. high, the stem branching above, and furnished with oval, half-clasping leaves, with spiny teeth; the flowers are in thistle-like heads at the ends of the

branches, with a leafy and prickly involucre; the florets are all tubular, and of a dark orange color; akenes (popularly seeds) without pappus, four-sided, white or brownish, and very smooth. The plant will perfect itself in the northern states, and is often seen in the gardens of those who raise medicinal herbs. When the florets are fully expanded, they are pulled out of the head and dried. The principal supply of commerce is from the East Indies, where the florets are pressed into small cakes an inch or two in diameter, and dried in kilns; afterward they are packed in bales of about 2 cwt. Formerly safflower was largely used in measles and other diseases accompanied by an eruption of the skin, and it is still kept in the drug stores, there being some demand for it in domestic practice; the home-grown, dried loosely, is preferred. It has at most a slightly diaphoretic effect. Safflower is sometimes used to adulterate the true saffron, a more expensive drug. (See SAFFRON.)—The chief use of safflower is as a dye, and before the introduction of aniline colors it was largely employed to impart to silk various shades of pink, rose, crimson, and scarlet; the colors, though fugitive, are very brilliant. It contains a yellow coloring principle, which is soluble in water and of no value, and a red coloring matter, carthamine or carthamic acid, which is insoluble in water, but soluble in alkaline liquids, from which it is precipitated by acids. When used as a dye, the yellow color is first extracted by kneading the safflower in bags under water; it is then treated with a solution of carbonate of soda; in the liquid thus obtained the silk, previously mordanted with lemon juice, is immersed. The pink saucers, sold for dyeing and for toilet purposes, are small white saucers with a thin coating of carthamine. Rouge is also prepared from it. (See ROUGE.)

SAFFORD, Truman Henry, an American mathematician, born in Royalton, Vt., Jan. 6, 1836. While a child he attracted public attention by his remarkable powers of calculation. He could mentally extract the square and cube roots of numbers of 9 and 10 places of figures, and at 14 produced the elliptic elements of the first comet of 1849. At this time he was widely known as the Vermont boy calculator. He graduated at Harvard college in 1854, and spent some time in professional studies in the observatory of that institution. Between 1850 and 1862 he computed the orbits of many planets and comets, and his labors were published in the monthly notices of the royal astronomical society of England, the *Astronomische Nachrichten*, and the "Astronomical Journal." From 1863 to 1866 he was connected with the Harvard observatory, part of the time as acting director, and was chiefly employed in observations for a standard catalogue of right ascensions. In the single year 1863 he determined the right ascension of 1,700 stars, and the declination of 450. In 1865 he became professor of astronomy in the univer-

sity of Chicago and director of Dearborn observatory. The first two years here were chiefly devoted to work upon the nebulae, many new ones being discovered. From 1869 to 1871 he was engaged upon the great catalogue of stars now forming by the coöperation of English, German, Russian, Norwegian, Swiss, and American astronomers. This undertaking, however, was interrupted by the total loss of the means of the Chicago observatory, and since 1872 Prof. Safford has been much employed in latitude and longitude work in the territories, by the United States engineers, for whom he has also prepared a star catalogue, which was published by the war department. He is now (1875) working upon another. He has edited vol. iv. (part i.) and vol. v. of the "Annals of Harvard College Observatory." The latter volume is taken up by the report of Prof. G. P. Bond's discoveries in the constellation of Orion, which Prof. Safford wrote out fully after Bond's death. Other contributions of Prof. Safford may be found in the same periodical, and also in the "Proceedings of the American Academy."

SAFFRON (Arab. *zafran*, from *asfar*, yellow), a drug consisting of the dried stigmas of *crocus sativus*. The genus *crocus* is famil-



Saffron Crocus (*Crocus sativus*).

iar through the spring-flowering garden sorts; the saffron crocus resembles these, but blooms in autumn; the flowers are pale violet, veined with purple, and very fragrant; the leaves appear soon after the flowers; the corm or bulb is rather larger than in the spring crocuses. The important part of the plant is the stigma, which is orange-red, with three drooping divisions, each about an inch long, and usually with a crest at the end; these are protruded beyond the flower. Saffron is mentioned by Solomon (Canticles iv. 14), and has been known and cultivated from very early times, so that its home is very doubtful; it grows spontaneously in Greece, but may have been intro-

duced by the early cultivators. The stigmas are collected and dried in sieves over a gentle fire, the operation being completed in half an hour. It requires the stigmas of 4,320 flowers to make an ounce of the dried saffron. In the genuine article the stigmas are loose and distinct; this is called hay saffron, to distinguish it from a factitious preparation of various substances pressed together on paper, called cake saffron. The principal production of the drug is in lower Aragon and other parts of Spain; a considerable amount of excellent quality is gathered in the department of Loiret, France; some is produced in Austria; and a small quantity is cultivated by the Germans in Lancaster co., Pa. It was formerly cultivated in England at Saffron Walden, but the supplies from that source have ceased. The cultivation sometimes fails entirely, on account of a fungus which destroys the bulbs. The drug has always borne a high price, on account of the labor required to collect the small stigmas which compose it, and has been subject to various adulterations; one of the most common is the admixture of safflower; another is the petals of the garden marigold; even shreds of beef have been used. All such adulterations are easily detected by soaking a small quantity of the drug in warm water; the peculiar form of the stigmas, with three long lobes, allows the true to be distinguished from the false at once. Saffron was formerly regarded as of so much importance that various countries had most stringent laws against its adulteration. In Germany in 1444 a man was burnt with his adulterated saffron, and in 1456 two men and a woman were buried alive in the same country for falsifying the drug. Saffron is of no value for any medicinal effect; it is now used but little in pharmacy, and then solely for its color. Its taste is of a warm, bitterish character, its odor sweet and penetrating, and its color a rich deep orange. A single grain of saffron rubbed to a fine powder with a little sugar will impart a distinct tint of yellow to 700,000 grains (10 gallons) of water. The coloring matter, termed polychroite, in allusion to the diversity of tints it is capable of assuming, is soluble in water and alcohol, but varies by the action of different acids. It is a peculiar glucoside, which by the action of acids splits into sugar, volatile oil, and a new coloring matter called crocine.

SAGA, a city of Japan, in the province of Hizen, at the head of the bay of Shimabara, island of Kiushiu; pop. about 100,000. It is regularly laid out, the streets crossing at right angles, is the principal seat of the trade of Kiushiu, and manufactures the famous Hizen porcelain ware. It has an ancient castle, a telegraph station, and government schools. It was the former capital of the prince of Nabeshima, one of the 18 semi-independent daimios, and the scene of much active labor by Jesuit missionaries in the 16th and 17th centuries. In 1872 it was the centre of a party which took up arms to compel the resignation

of the Tokio cabinet, and the acquiescence of the government in the projected invasion of Corea. This rebellion was suppressed in a few days, several regiments of the national army in government transports and chartered American steamers arriving at Saga, and after a battle and some skirmishing restoring the authority of the central government. The principal leader and 13 others, including two students educated abroad, were decapitated; 195 persons were condemned to various punishments; more than 7,500 insurgents surrendered; and 50 villages in the vicinity and about 1,000 houses in Saga were burned.

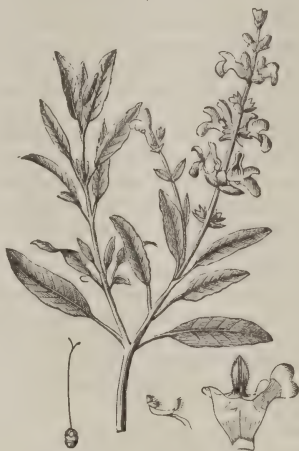
SAGADAHOC, a S. county of Maine, bordering on the Atlantic, and intersected by the Kennebec river; area, about 300 sq. m.; pop. in 1870, 18,803. Nearly half the county is composed of small islands at the mouth of the Kennebec, and it has numerous bays and channels. The soil is fertile. The inhabitants are largely engaged in ship building, fishing, and the coasting trade. It is intersected by the Portland and Kennebec, the Bath and Rockland, and the Androscoggin railroads. The chief productions in 1870 were 18,225 bushels of Indian corn, 15,849 of oats, 21,951 of barley, 103,928 of potatoes, 25,060 tons of hay, 29,416 lbs. of wool, and 264,862 of butter. There were 1,340 horses, 3,125 milch cows, 1,668 working oxen, 2,835 other cattle, 8,151 sheep, and 1,098 swine. The county contained 37 saw mills. Capital, Bath.

SAGAN, a town of Prussia, in the province of Silesia, on the Bober, 45 m. N. W. of Liegnitz; pop. in 1871, 10,433. It has a fine palace, four churches, and a Catholic gymnasium, and cloth and other manufactories. It is the capital of a mediatized principality, which in 1627 became the property of Wallenstein, in 1646 of Prince Lobkowitz, and in 1786 of Duke Peter of Courland, whose daughter Dorothea bequeathed it in 1862 to her son Prince Louis Talleyrand, duke of Sagan and of Valençay.

SAGAPENUM, a gum resin, of unknown botanical origin, which has been used in medicine. Its properties were known to the ancients, and it is spoken of by Hippocrates, Dioscorides, and Pliny. But at present it can scarcely be procured genuine even at Bombay, whither it is sometimes brought from Persia. It is received in agglutinated fragments of brownish and reddish yellow colors, of consistence like wax, of a garlicky odor, less disagreeable than that of asafoetida, and of a hot, nauseous, bitterish taste. It has no medicinal value.

SAGE (*Fr. sauge*), the name given to species of *salvia*, of the labiate family, and especially to the common or garden sage, *S. officinalis*. The genus *salvia* (Lat. *salvare*, to save, in reference to reputed medicinal qualities) is a large one, containing more than 400 species, distributed in nearly all parts of the world, and including plants which are very unlike in external appearance, and mainly distinguished by the structure of the anthers, which have the two cells widely separated by a transverse connec-

tive, one cell being perfect and producing pollen, while the other, at the opposite end of the connective, is deformed and abortive. There are two native species in the middle states, four others in the southern, and several others in the far western and southwestern states.



Garden Sage (*Salvia officinalis*).

The garden sage, the best known species, is a hardy, half shrubby plant from the south of Europe; its oblong-lanceolate leaves are rough with a fine network of veins, minutely pubescent, and of a dull hoary green color; the flowers are in whorled spikes, usually blue, but the varieties present other colors. The plant has a peculiar aromatic odor and a warm and bitterish taste. Besides the common form, there are broad and narrow-leaved varieties, and variegated forms, one of which, under the name of *salvia tricolor*, is cultivated as an ornamental plant. Sage has been used medicinally since very early times, its Latin name indicating the esteem in which it was formerly held; besides being an aromatic stimulant, it has tonic and astringent properties, and its infusion is frequently given in domestic practice; it is a useful gargle in sore throat with relaxed uvula. But its chief use is as a condiment or seasoning for stuffings, sausages, and other cookery; and it is sometimes used to flavor cheese. The market gardeners around New York cultivate sage entirely as an annual; seeds are sown in a bed in April, and in June or July the plants are set out in rows 12 in. apart, on land from which cabbages, peas, or other early crops have been removed, and the plants are cut in September or later. Where sage is dried and pressed into cakes for market, it is treated as a perennial; the flower spikes are cut out as they appear, and the leafy shoots gathered and dried.—Clary is a species of sage (*S. sclarea*), with much larger leaves than the common, with a strong and to many persons unpleasant flavor; it is rarely seen in our gardens, but is used in Europe for flavoring soups.

The scarlet sage, *S. splendens*, from Brazil, is a common and much esteemed garden plant, usually called by its botanical name, salvia; it is a smooth and much-branching species, with dark green ovate leaves, and long spikes of flowers of the most brilliant scarlet; the calyx is of the same color with the corolla, and each flower is subtended by a conspicuous floral leaf or bract, also scarlet; as these bracts remain after the flowers have fallen, much of the effectiveness of the plant is due to them. It is a tender perennial, but will flower the first year from the seed; it is often treated as an annual, but it is most frequently raised by cuttings from plants kept in a greenhouse for the purpose. A sport from this has pure white flowers, and there are several garden forms, one more dwarf than the type. *S. fulgens*, from Mexico, and *S. coccinea*, from Central America, are scarlet-flowered species, sometimes cultivated. The blue sage, *S. patens*, from Mexico, has flowers of the most charming blue, but the plant has a coarse weedy habit. The silver-leaved sage, *S. argentea*, from the Mediterranean, with very large ovate or roundish, radical leaves, covered with white woolly hairs, is sometimes cultivated for its foliage only; the flowers are white, and not showy.—Some of the native species suitable for the garden are *S. azurea* of the southern states, 2 to 4 ft. high, with fine blue flowers; *S. Pitcheri*, growing from Kansas to Texas, covered with a soft down; and *S. farinosa*, of Texas, white-hoary, with light blue flowers.

SAGE, Antoine René le. See LE SAGE.

SAGE BUSH. SEE ARTEMISIA.

SAGHALIEN, or *Saghalin*, an island of Russia, formerly jointly claimed and occupied by Russia and Japan, off the E. coast of Asia, between lat. 45° 56' and 54° 25' N., and intersected by the meridians 142° and 143° E.; length about 600 m., breadth from about 20 to 80 m.; area, 24,560 sq. m.; pop. about 16,000, including Russians, Japanese, Chinese, Ainu and other natives, and some persons of European and American extraction. The entire coast does not present a single safe harbor, and the largest bays are so shallow that ships can rarely go nearer than 1 m. to the shore. The strait of Mamio Rinzo, between Cape Muraviev in the Littoral province of Siberia and the island, is not more than 5 m. wide, and is frozen over three or four months in the year, affording connection by dog teams over the ice with the continent. The strait of La Pérouse separates Saghalien from the Japanese island of Yezo. Through the entire length of the island, almost on meridian 143°, is a range of mountains more than 2,000 ft. high, and in the S. part are peaks of 4,000 ft. Below lat. 52° there is a parallel range on the E. side. None of the mountains are volcanic. As yet the exploration is but partial, and the exact topography of the island is unknown. There are rich deposits of coal along the entire shore on the W. side. The two principal riv-

ers, Baronai and Tymi, rise near each other in lat. 50° 40', the first flowing S., the second N., neither more than 106 or 112 m. long, and both navigable for boats. There are four lakes of from 15 to 37 sq. m., all united with the sea by small and deep channels, and numerous lesser lakes in the northwest. The climate is cold, damp, and foggy, with abundant rain in summer; and snow falls for days together in winter and lies on the mountains till the middle of May. The mean temperature is 62° F. in July, and 14° in January. The soil varies in quality, and is little cultivated, the inhabitants subsisting chiefly upon fish and game, while corn is imported from Russia and rice from Japan. There are a few plains and natural meadows. Besides coal and petroleum, the natural riches of the island are the woods, furs, and fisheries. The woods covering the mountains consist of Norway spruce, fir, Siberian silver fir, pines, and deciduous trees from the birch to the elm. The hunting grounds furnish sable, fox, deer, and bear skins. Seals, sea lions, and whales abound in the neighboring seas. Fish are plentiful in the estuaries and rivers, particularly salmon, and in autumn swans, geese, ducks, and other wild fowl. Large quantities of dried and salted salmon and herring are sent to Japan. Most of the furs go to Russia, some to Japan, and a few to the United States. The chief trading posts are at Aniva bay on the S. end of the island, and the trade is carried on mainly by barter.—About 1780 the Japanese began to settle the shores in the S. part, while the Russians were invading the N. part. In 1804 the two nations unsuccessfully attempted to fix upon a boundary of occupation. In 1852 some Americans tried to found a post to open trade with the continent, and Russia immediately took formal possession of the island, sending men from Siberia to build forts and establish posts, and in 1853 they opened some of the coal mines. In 1854 Russia renewed negotiations as to boundary with Japan, and the island was declared "still unpartitioned," Japan claiming all below lat. 50°, while the Russians had actually colonized considerably S. of that parallel. A joint occupation was agreed upon, and in 1875 the Japanese portion of the island was formally ceded to Russia. In 1873 Russia made its colony a penal settlement and sent convicts to work the coal mines.

SAG HARBOR, a village and port of entry in the towns of East Hampton and Southampton, Suffolk co., New York, on the S. side of Gardiner's bay, near the E. extremity of Long Island, and at the terminus of a branch of the Long Island railroad, by which it is 107 m. E. of New York; pop. in 1870, 1,723; in 1875, 2,100. It has a good harbor, and is largely engaged in the coasting trade, being the only outlet of a good farming district. The whale fishery, once extensive, is now extinct. Sag Harbor is much resorted to in summer. Two lines of steamers run to New York and one to the Connecti-

cut river. The village contains a cotton mill, a flour mill, three cigar manufactories, a savings bank, two private banks, a union school, two weekly newspapers, and Baptist, Episcopal, Methodist, Presbyterian, and Roman Catholic churches.

SAGINAW, a river of Michigan, formed at Saginaw City by the confluence of the Cass, Shiawassee, and Tittibawassee rivers. It flows nearly N. for 18 m., and empties into Saginaw bay. It is navigable by the largest steamers. Its branches and tributaries, flowing from all points, drain a large area.

SAGINAW, an E. county of Michigan, drained by the Saginaw river and its affluents; area, about 900 sq. m.; pop. in 1870, 39,097. The surface is level or gently undulating, and the soil very fertile. The principal exports are fish and pine lumber. Water power is abundant. It is intersected by several railroads centring at Saginaw. The chief productions in 1870 were 37,255 bushels of wheat, 43,349 of Indian corn, 52,295 of oats, 86,999 of potatoes, 14,926 tons of hay, 16,086 lbs. of wool, and 318,275 of butter. There were 1,894 horses, 3,077 milch cows, 3,775 other cattle, 5,258 sheep, and 3,216 swine; 36 manufactories of carriages and wagons, 42 of salt, 86 saw mills, 6 planing mills, 5 flour mills, and 7 breweries. Capital, Saginaw.

SAGINAW, or **Saginaw City**, a city and the capital of Saginaw co., Michigan, on the W. bank of the Saginaw river, here formed by the confluence of the Cass, Shiawassee, and Tittibawassee rivers, and crossed by three bridges, 18 m. above Saginaw bay, and partly opposite East Saginaw, 115 m. N. W. of Detroit; pop. in 1860, 1,699; in 1870, 7,460; in 1874, 10,064. It is finely situated and tastefully laid out and built. The ground rises from the river to a moderately elevated table land. The corporate limits extend about 4 m. along the river, with an average width of 2 m. Washington street, a fine avenue, extends through the city parallel to the river. E. of it are most of the business places, while on the W. side are the county buildings and most of the churches, school houses, and residences. A good supply of water is furnished, on the Holly plan. Horse cars run to East Saginaw. The city is connected with Detroit and other points in the state by the Michigan Central, the Flint and Père Marquette, and the Saginaw Valley and St. Louis railroads. Saginaw has an extensive business in furnishing supplies for the lumber regions, and possesses large interests in saw mills and salt works in the adjacent country. The principal manufacturing establishments within the city limits are eight large saw mills, three planing mills, sash and door manufactories, extensive stave and barrel works, four shingle mills, and eight salt works. The city contains a national bank, a private bank, several hotels, a central and five ward schools, two weekly newspapers, and Baptist, Episcopal, German Lutheran, Methodist, Presbyte-

rian, Reformed Lutheran, and Roman Catholic churches.—Saginaw was first settled in 1822, and received a city charter in 1859.

SAGINAW, East. See EAST SAGINAW.

SAGINAW BAY. See HURON, LAKE.

SAGO, a form of starch obtained from the trunks of several species of palm. *Sagu* (also written *zagu* and *saga*) is the Malay name for the starch and the tree which yields it, and is in Java the name for bread prepared from the farina. It was formerly supposed that sago was the product of *cycas revoluta*, a palm-like tree belonging to a very different family, which is even mentioned in some recent works as its source, and the tree is still to be found in greenhouse collections as the "sago palm;" while its trunk contains starch, it affords none of the sago of commerce. Several of the



Sago Palm (*Sagurus Rumphii*).

palms, especially those which flower but once, accumulate in the tissues of their trunks a large amount of starch, as a preparation for the nourishment of the future flower and fruit; and in countries where palms abound, the inhabitants make use of this as food, while it is not known in commerce. (See PALM.) The sago of the shops is mainly produced by *sagurus levis*, the smooth, and *S. Rumphii*, the prickly sago palm, both natives of the islands of the Indian archipelago and other islands of that part of the world; the smooth species grows from 25 to 50 ft. high, while the other, which mainly differs in having its leaf stalks and the spathe or sheath to the flower cluster armed with sharp prickles, is rarely over 30 ft. Both have graceful crowns of large pinnate

leaves, and a one-seeded fruit an inch and a half in diameter, covered with shining reversed scales. Left to themselves, the trees attain their full growth in about 15 years, flower, produce their fruit, which is about three years in coming to perfection, and then die. To obtain the sago, the trees are felled as soon as they show signs of flowering; it is often stated that the starch is obtained from the pith of the trees, but palms have no true pith, and the starch, accumulated to nourish the fruit, is found to be deposited all through the tissues of the trunk, except in the hard rind; when allowed to bear fruit, the trunk finally becomes a nearly hollow shell. The trunk is cut into convenient lengths, which are split in halves, and the interior soft portion is scraped out and pounded in successive waters until all the starch is separated; the water in which the starch is suspended is allowed to stand until this settles, and the fibrous matter, which floats, is poured off with the water. The sediment is repeatedly washed, and when freed of all extraneous matter it is dried, and is then called sago meal. In this form it is but little known in this country, that which is imported being consumed in manufacturing processes; it is the crude starch of the palm. The form in which sago is usually seen is that called granulated or pearl sago; the wet starch is dried, broken up, and pounded and sifted until of a somewhat regular size, the larger grains being of the size of mustard seed, intermixed with numerous smaller ones; the process of granulation is not known in full, but it is said that heat and mutual attrition by rubbing in a bag are used to form and shape the grains. Sago meal, the unprepared starch, presents under the microscope a great many muller-shaped granules, *i. e.*, elongated, rounded at one end and truncate at the other; the granules of pearl sago are larger and less regular, being changed by the heat used in preparing it. Sago is usually of a pinkish or slightly brownish tint, but it is sometimes artificially bleached and pure white; it swells up in cold water, and does not completely dissolve by boiling. It has the general properties of other amylaceous foods, and is principally eaten in the form of sago pudding. A facitious sago is sometimes met with, in which the grains are much larger and more regular than in the true, and of a pure white; this is made from potato starch, and may be readily detected under the microscope, as the potato starch granules are much larger than those of sago and of a different shape.

SAGOSKIN. See ZAGOSKIN.

SAGUACHE, a S. county of Colorado, forming the N. extremity of San Luis park, bordered on three sides by mountains, and watered by affluents of the Gunnison and Arkansas rivers; area, about 2,500 sq. m.; pop. in 1870, 304. The valleys are natural meadows, covered with a rich vegetation, and the table lands afford fine natural pasturage. In the S. part is a

lake, 24 by 10 m., which has a regular ebb and flow. The chief productions in 1870 were 5,921 bushels of wheat, 5,527 of oats, 1,061 of potatoes, 6,800 lbs. of wool, 6,250 of butter, and 174 tons of hay. There were 129 horses, 2,052 milch cows, 1,751 other cattle, and 3,100 sheep. Capital, Saguache.

SAGUENAY, a river of Quebec, Canada, flowing from Lake St. John by two outlets, which unite 9 m. E. of the lake (see QUEBEC, vol. xiv., p. 135), to the St. Lawrence at Tadoussac, 120 m. below Quebec; length about 100 m. From the junction it flows S. E. with a stream from $\frac{1}{2}$ m. to 2 m. in width, at first between gently sloping banks; but below Grand or Ha! Ha! bay it forces its way through perpendicular cliffs of granite and syenite, one of them, Cape Trinity, towering 1,500 ft. above the river, and another near it, called Pointe d'Éternité, still more lofty. Ha! Ha! bay is on the W. side of the river, about 60 m. from its mouth, and is about 9 m. wide and 9 m. long, with a depth of from 15 to 35 fathoms. The depth of the river is remarkable; 34 m. from its mouth there is a recess or bay which is $1\frac{1}{2}$ m. deep; and at another point, a little lower down, called St. Jean's bay, the depth is $1\frac{1}{2}$ m. Its average depth in mid-channel, according to Admiral Bayfield, is 145 fathoms. It is navigable for steamboats to Chicoutimi, 75 m. from its mouth; above that point the rapids prevent navigation, and at low water a bar about 60 m. from its mouth prevents large vessels from ascending.

SAGUENAY, the N. E. county of Quebec, Canada, bordering on the river and gulf of St. Lawrence; area, 68,840 sq. m.; pop. in 1871, 5,487, of whom 3,519 were of French and 390 of English origin or descent, and 1,309 were Indians. It includes the island of Anticosti, and embraces the portion of Labrador belonging to the province. The Saguenay river intersects the S. W. extremity, and numerous other rivers flow into the river and gulf of St. Lawrence. The settlements are scattered along the coast, and the inhabitants are engaged in fishing. Capital, Tadoussac.

SAGUNTUM, or **Saguntus**, an ancient town of Spain, the ruins of which, consisting of a theatre and a temple of Bacchus, are still visible at Murviedro in the province of Valencia, near the mouth of the river Palancia in the Mediterranean. It was founded, according to tradition, by a Greek colony from Zacynthus (Zante), who named it after their native island, but owes its celebrity in history to its destruction by Hannibal, 219 B. C., which immediately led to the second Punic war. It was rebuilt by the Romans and made a colony. The name of the modern town on its site is derived from *muri veteres* (old walls). The ruins of the ancient theatre, the general form of which is still perfect, were enclosed with a wall in 1867.

SAHAPTINS, or **Saptins**, a family of North American Indians, living west of the Rocky

mountains and extending from the Dalles of the Columbia to the Bitter Root mountains, on both sides of the Columbia, and on forks of the Lewis and the Snake or Sahaptin rivers. They have the Selish family on the north and the Shoshones on the south. The family embraces the Nez Percés or Sahaptin proper (see NEZ PERCÉS), the Palus, the Tairtla, the Wallawallas, the Yakamas and Kliketats, and according to some the Wailatpus or Cayuses.

SAHARA, the largest desert in the world, occupying an area estimated at from 1,500,000 to 2,500,000 sq. m., in the N. portion of Africa, across which it extends 3,000 m. from the Atlantic ocean to the valley of the Nile, with a width of 1,000 m. between Soodan and the countries bordering the Mediterranean sea. As the same sterile region is renewed beyond the Nile, its E. and W. boundaries may be regarded as coterminous with those of the continent itself, while the 15th and 30th parallels of N. latitude mainly form its southern and northern limits. Under the name of the Algerian Sahara, it extends considerably N. of the 30th parallel along the southern base of the Atlas, and closely approaches the Mediterranean W. of the gulf of Cabes. Here the marshy depressions known as *shotts*, of which the so-called Melrir lake is best known, constitute a basin into which it has been proposed to admit the waters of the sea by means of a canal. Continuations of the Sahara stretch eastward and northward through Arabia, Persia, and central Asia into Mongolia, where they terminate in the desert of Gobi. The great desert of Africa presents an alternation of immense burning wastes of loose and moving sand, with tracts of barren rock, stony plains of gravel, many of which are covered with saline deposits, and elevated and rocky plateaus rising into mountains with extensive valleys and expanses of sand between them. The average elevation of the Sahara above the sea is estimated at 1,500 ft., although the surface is known to be depressed in many places below the level of the ocean. Its most mountainous portion lies along the caravan routes between Tripoli and Bornoo and Houssa, where the general altitude of the table land, beginning on the north in the plateau of Hamadah, ranges from 1,000 to 2,000 ft., amid peaks of double these heights, attaining the maximum in the mountains of the oases of Asben, 5,000 ft. The desolate region of the west, called Sahel (the plain), comprises the greatest expanse of sand and salt desert. Its hills encroach upon the Atlantic in a long line of banks pushing out into the sea between Cape Bojador and Cape Blanco. In this portion of the desert oases are few and small, and there is little travel. East of the oasis of Fezzan the Sahara becomes known as the Libyan desert, and is comparatively level, sloping toward the Mediterranean with a gentle gradient. (See LIBYAN DESERT.) Here oases, the only permanently inhabited places of the desert, are

most numerous. (See OASIS.) The character of the S. border of the Sahara is imperfectly known, but is believed to be mountainous. In the north it is skirted by extensive treeless pasture lands along the base of the Atlas range, reaches the shores of the Mediterranean at the gulf of Sidra, and further E. is bounded by the table land of Barca.—A climate of burning aridity prevails on the great desert of Africa. Rain is utterly unknown except in the oases and on the mountains, where it occasionally falls with such violence as to produce torrents that suddenly pour down into the valleys, and almost as suddenly disappear. The sterility of the Sahara is largely attributable to the fact that the prevailing N. E. trade winds which blow over its surface bring it no moisture, having been almost drained of aqueous vapor in their long continental journey over Europe and Asia. On the mountains S. of the Mediterranean they deposit more than they have collected in their brief passage over that sea. When they reach the heated desert beyond, where the absorptive capacity of the air is greatly increased by the access of temperature, they bear away moisture instead of bringing it, and it is not condensed into rain until it reaches the mountains of central Africa. The Sahara is probably subject to a higher temperature than any other region on the globe; the thermometer there has been known to register 133° F. This terrific heat imparts their dreaded characteristics to the simoom and other similar winds which blow off the desert. (See AFRICA.) Notwithstanding the obstacles to travel offered by the desert, it is constantly crossed on various routes by caravans of traders. In the absence of watercourses, were it not for the camel, well termed in oriental language "the ship of the desert," these wastes would be impassable to man. Nocturnal radiation is extremely rapid, and the nights are usually cold.—The geological formation is unfavorable to fertility, and although in some localities a growth of thorny bushes and plants peculiar to the desert is met with, the vast bodies of silicious sand afford little or no nutriment to vegetation, and their unstable nature is opposed to its development. Even in mineral productions the desert maintains its character as a barren waste. No useful products are obtained except salt, which is collected by caravans and sold in Soodan. The fauna of the desert proper includes snakes, lizards, scorpions, and ants; but the animals of its borders and the oases comprise about 50 species of mammals, including the lion and leopard, the giraffe, and various antelopes. The marked distinction between the faunas of N. and S. Africa, separated by the desert, is explained by the supposition that a portion of the Sahara was submerged beneath the sea during the pliocene period of geology. Marine shells have been discovered S. of the Atlas, and lines of sea beach, showing that at no very remote geological period the plains formed the bed

of the ocean. According to Sir Charles Lyell, the Sahara was under water between lat. 20° and 30° N. at one time during the glacial epoch, so that there was water communication between the southern part of the Mediterranean and that portion of the Atlantic ocean now bounded by the W. coast of Africa. A project has of late been advocated of reconverting the deeper part of the Sahel, an area of about 126,000 sq. m., into a sea, by cutting a canal from the Atlantic through the sand hills which form the western border.

SAIDA (anc. *Sidon* or *Zidon*), a town of Syria, in the pashalic of Acre, 24 m. S. S. W. of Beyrout, on the N. W. slope of a promontory projecting into the Mediterranean; lat. 33° 34' N., lon. 35° 23' E.; pop. about 6,000,

principally Moslems and Greeks. It has several great khans or caravansaries. The harbor was filled up by the emir Fakhr ed-Din in the 17th century, and is now only accessible for boats. A ruinous old castle, supposed to have been built about the beginning of the Christian era, occupies a large artificial rock or mole at the mouth of the harbor, and is connected with the city by a bridge of nine arches. The chief trade of the town is in silk. The environs are famous for their fruit. The ruins of ancient Sidon are about 2 m. inland. On Jan. 20, 1855, a sarcophagus, now in the Louvre, was discovered among these ruins, with a Phœnician inscription 22 lines in length, indicating that it had been the resting place of Eshmunazar, king of the Sidonians, of uncer-



Saida.

tain date. About the same time several pots of gold coin, of the age of Alexander the Great, were disinterred here; the whole amount was of the value of about \$40,000. The ancient necropolis was excavated in 1860 by the French expedition under M. Renan.—Saida was bombarded and taken by the allied Turkish, Austrian, and English fleets in 1840. (See *SIDON*.)

SAID PASHA, viceroy of Egypt. See *EGYPT*, vol. vi., p. 467.

SAIGON, or *Saigon*, a city of Further India, capital of French Cochinchina, on the river Saigon, 35 m. from its mouth; pop. estimated at from 60,000 to 120,000. It consists of two separate towns connected by a navigable river and a road 2 m. long. The citadel was begun by a French engineer in 1790, and now includes barracks, officers' quarters, and a governor's residence. There are a large naval yard, an arsenal, two pagodas, and extensive rice magazines. The river Mekong communicates with the Saigon by a canal. The city is an important seat of commerce, exporting rice, cinnamon, and valuable woods, and is a

convenient station for commercial and postal steam lines.—Saigon formerly belonged to Anam. It was captured and occupied by the French under Admiral Rigault de Genouilly, Feb. 17, 1859, and it became French territory by treaty, June 5, 1862.

SAIL. See *SHIP*.

SAILING. See *NAVIGATION*.

SAIMIRI. See *MONKEY*.

SAINFOIN (Fr., wholesome hay), a fodder plant (*onobrychis sativa*) of the order *leguminosæ*, growing spontaneously in the limestone districts of England, middle and southern Europe, and Asia. Its roots are perennial, and are capable of penetrating to a great depth; its stems recumbent or nearly upright, 2 or 3 ft. long; its smooth pinnate leaves consist of 9 to 15 opposite and acute leaflets; the flower stalks are axillary, longer than the leaves, terminated in July by spikes of pink flowers, which are followed by small, flat, hard, one-seeded pods, having raised veins and often prickly on the edges. The plant has been cultivated since very early times, its botanical

name being the ancient Greek one. It was introduced into Great Britain about the middle of the 17th century, and is there a valuable crop on chalk lands, but on alluvial soil is in-



Sainfoin (*Onobrychis sativa*).

ferior to lucern; it is cut and made into hay; too close pasturing kills the roots. Occasional experiments have been made with it in this country, but as it requires three or four years to become thoroughly established, it is not suited to our agriculture. (See LUCEEN.)

SAINT. See CANONIZATION.

SAINT ALBANS, a town and the capital of Franklin co., Vermont, bordering on Lake Champlain, at the junction of several divisions of the Central Vermont railroad, 52 m. N. W. of Montpelier, 23 m. N. by E. of Burlington, and 14 m. S. of the Canada line; pop. in 1850, 1,814; in 1860, 3,637; in 1870, 7,014. The surrounding country abounds in fine scenery. The principal village is on an elevated plain 3 m. from the lake. In its centre is a neat park of four acres, around which are the county buildings, hotels, one of the school houses, and several churches. In the vicinity are quarries of calico stone and variegated marble, and a sulphur spring. There is a market every Tuesday, when the farmers from the adjacent country assemble, and large quantities of dairy products are sold. The quotations of butter and cheese at St. Albans affect the market throughout the eastern states. About 350,000 lbs. of butter and 5,000 lbs. of cheese, worth \$110,000, are shipped annually, chiefly to Boston. The town contains the extensive car shops of the railroad company, a manufactory of carriages, several marble shops, iron and steel works, a rolling mill producing steel rails, and manufactories of mowers, stoves, and various kinds of castings. There are two national banks, a savings bank and trust company, six hotels, graded and grammar schools occupying two buildings, two daily newspapers, one issuing a semi-

weekly and the other a weekly edition, a nunnery, and six churches.

SAINT ALBANS, a town of Hertfordshire, England, 20 m. N. W. of London; pop. in 1871, 8,303. It is built on the summit and side of a hill, has little trade, and the principal manufacture is straw plaiting and straw bonnet making. The cathedral-like abbey church was part of a Benedictine monastery founded in 795, and St. Michael's church contains the remains of Lord Bacon. The town was disfranchised for bribery in 1852.—St. Albans was built in 950, and incorporated by Edward VI. in 1553. It is near the site of the Roman Verulamium (Verulam), ruins of whose walls are still visible. During the wars of the roses two battles were fought here: on May 22, 1455, when the duke of York gained the day and the duke of Somerset, who led the Lancastrians, was killed; and on Feb. 17, 1461, when Queen Margaret, commanding the Lancastrians, gained a victory over the Yorkists, led by the earl of Warwick, and rescued Henry VI. from captivity.

SAINT ALBANS, Harriet Mellon, duchess of, born about 1775, died Aug. 6, 1837. She was a popular comic actress, when she married Mr. Coutts, a wealthy London banker. She soon after became a widow and sole mistress of a colossal fortune. On June 16, 1827, she married the duke of St. Albans, and when she died left him an income of £10,000 per annum with a life interest in some landed estates; but the great bulk of her vast property was left to Miss Angela Georgina Burdett, daughter of Sir Francis Burdett and granddaughter of her first husband. (See BURDETT-COUTTS.)

SAINT ANDREWS, a city and parish of Fifeshire, Scotland, on the North sea, between the mouths of the friths of Forth and Tay, 31 m. N. E. of Edinburgh; pop. of the city in 1871, 6,316. It is the seat of the university of St. Andrews, founded in 1411, and comprising St. Leonard's and St. Salvator's colleges (now united) and St. Mary's divinity college. The library of the united colleges has about 100,000 volumes. The university is the oldest in Scotland. The Madras school, the chief object of which is the gratuitous instruction of poor pupils, was founded by Dr. Andrew Bell.

SAINT ANDREWS, a port of entry and the capital of Charlotte co., New Brunswick, on a low narrow peninsula between Passamaquoddy bay and the mouth of the St. Croix river, at the S. terminus of the New Brunswick and Canada railroad, 65 m. S. S. W. of Fredericton; pop. in 1871, 2,961. The situation is convenient for commerce and the fisheries. The harbor is entered by two passes from the mouth of the St. Croix, and admits vessels of any size. The lumber trade and ship building are the chief industries. The value of imports for the year ending June 30, 1874, was \$107,065; of exports, \$66,798.

SAINT ANTHONY, Minn. See MINNEAPOLIS.

SAINT ANTHONY'S FIRE. See ERYSIPELAS.

SAINT-ARNAUD. See LEROY DE SAINT-ARNAUD.

SAINT AUGUSTINE, a city, port of entry, and the county seat of St. John's co., Florida, on the E. coast, 33 m. S. S. E. of Jacksonville; pop. in 1870, 1,717, of whom 594 were colored; in 1875, about 2,000. It occupies a peninsula, formed by the Matanzas river on the east and the St. Sebastian on the south and west. Directly in front is Anastasia island, forming a breakwater. Along the E. front of the city, about a mile, is a sea wall 4 ft. wide, built by the United States in 1837-'42, affording a delightful promenade on moonlight evenings. On the N. end of Anastasia island (S. side of the entrance to the port) is a revolving light, lat. 29° 53' N., lon. 81° 16' W. The streets, which are generally narrow, cross each other at right angles. In the centre is a fine public square, called the "Plaza de la Constitucion," on which are the custom house and post office, an imposing structure, formerly the residence of the Spanish governor, remodelled by the United States; the Roman Catholic cathedral, a large edifice in the Moorish style, erected in 1793; the Episcopal church, the old convent, and the ancient markets. Until within a few years the only material used in building was the coquina rock, a conglomerate of small sea shells, quarried on Anastasia island, and dried hard in the sun. The barracks are among the finest and most complete in the country. The building was formerly a Franciscan monastery. The old Spanish wall, which extended across the peninsula from shore to shore, and protected the city on the north, is in ruins. The principal object of interest to visitors is the old fortress of San Marco, now Fort Marion. It is of coquina, is well preserved, and will accommodate a garrison of 1,000 men. It was finished in 1756, after having been more than a century in construction, and was built entirely by Indian slaves. On account of the mildness of its climate, St. Augustine is much resorted to in the winter from the north; the number of visitors in 1874-'5 was more than 7,000. The mean annual temperature is 70°; frosts seldom occur, and semi-tropical fruits flourish. The chief business is the manufacture of "palmetto straw" work, which is largely shipped to the north. There is some coasting trade. Two lines of sailing packets run to New York. A railroad, 14 m. long, extends to Tocoi on the St. John's river, whence steamers ply to Jacksonville. There are four hotels, with accommodations for 700 guests; two free schools, one conducted by the sisters of charity, the other supported by the Peabody fund, each having about 200 pupils; two weekly newspapers; a public library of about 1,000 volumes; two convents; and five churches, viz.: Baptist (colored), Episcopal, Methodist (colored), Presbyterian, and Roman Catholic. About four fifths of the white inhabitants are of Spanish origin, and belong to the Catholic church.—St. Augustine is the

oldest town in the United States, a fort having been built here by the Spaniards under Menendez in 1565. It was several times attacked by the French, English, and Indians. With the rest of Florida it came into the possession of the English by the treaty of 1763, was ceded to Spain in 1783, and transferred to the United States in 1819.

SAINT BARTHOLOMEW, an island in the N. E. angle of the West Indian archipelago, about 25 m. N. of St. Christopher; area, 8 sq. m.; extreme length 6 m., greatest breadth 3 m.; pop. about 2,900, chiefly colored. The shores are deeply indented; the surface consists of barren hills and fertile valleys, yielding fruit, vegetables, sugar, cotton, and tobacco. The highest point, 992 ft., is near the E. end. Fuel and water are scarce. The climate is warm but healthful, owing to the trade wind. Gustavia, the capital, is on an arm of the sea opening into a bight on the S. W. side; it is a free port, but the harbor is too shallow to admit large vessels. The island was settled by the French in 1648, and finally came into the possession of Sweden in 1785. It is the only Swedish colony in the West Indies.

SAINT BARTHOLOMEW, Massacre of. See BARTHOLOMEW, SAINT.

SAINT BERNARD, a S. E. parish of Louisiana, between the gulf of Mexico and the Mississippi river, having Lake Borgne on the north; area, 620 sq. m.; pop. in 1870, 3,553, of whom 1,913 were colored. The surface is level and the soil fertile, the higher portions producing large crops of sugar cane. The chief productions in 1870 were 12,775 bushels of Indian corn, 32,767 of sweet potatoes, 190,480 lbs. of rice, 61 bales of cotton, 680 hogsheds of sugar, and 42,580 gallons of molasses. There were 7 molasses and sugar establishments. Capital, St. Bernard.

SAINT BERNARD. I. Great, a mountain pass in the Pennine chain of Alps, between Martigny in the Swiss canton of Valais and the Piedmontese valley of Aosta. There is no mountain bearing the name. The highest point of the pass is about 8,000 ft. above the sea. On the east is Mont Velan and on the west the Pointe de Dronaz. At the highest elevation of the pass, near the line of perpetual snow, is the *hospice* or monastery of St. Bernard, the highest dwelling in Europe. Its inmates are Augustinian monks, assisted by lay brethren (*marronniers*), celebrated with their dogs for rescuing travellers. In their hospice at times as many as 500 or 600 travellers have been accommodated at once. The snow around the hospice averages 7 to 8 ft. in depth, and the drifts sometimes rest against it and accumulate to the height of 40 ft. The severest cold recorded was 29° below zero, and the greatest heat 68° F. A monastery is believed to have existed on the Great St. Bernard previous to the foundation of the present hospice by St. Bernard of Menthon, in 962. Its most flourishing period was at the end of the 15th century, but it now depends on gifts and

collections. The route over the Pennine Alps by the Great St. Bernard was traversed by Roman armies, by armies under Charlemagne and Frederick Barbarossa, and in May, 1800, by a French army under Napoleon. A wagon road from Martigny to Liddes was completed in 1850. **II. Little**, a mountain of the Graian Alps, S. of Mont Blanc, on the frontier of Savoy, about 7,200 ft. high. It has a comparatively easy pass leading from the valley of the Isère into that of the Dora Baltea, which is believed to have been traversed by Hannibal in his descent into Italy. At a height of 7,076 ft. above the level of the sea is another convent founded by St. Bernard of Menthon for the relief of travellers.

SAINT-BRIEUC, a town of Brittany, France, capital of the department of Côtes-du-Nord, on the Gouet, 2½ m. from its mouth in the bay of St. Brieuc, 233 m. W. by S. of Paris; pop. in 1872, 15,253. It has a school of hydrography, a cathedral of the 13th century, and a statue of Du Guesclin. It is largely engaged in the whale and cod fisheries, and has an active trade in butter and cider. The port, called Légué, is 2 m. down the stream.

SAINT CATHARINES, a town, port of entry, and the capital of Lincoln co., Ontario, Canada, on the Welland canal and the Great Western and Welland railways, 35 m. S. of Toronto; pop. in 1861, 6,284; in 1871, 7,864. It is celebrated for its mineral springs, and is the centre of a large and rapidly increasing business. It contains five or six large flouring mills, several saw and planing mills, foundries and machine shops, a sewing machine factory, soap and candle factories, tanneries, woollen mills, breweries, ship yards, &c. There are three branch banks, excellent hotels, a hospital, grammar school, commercial college, three daily and three weekly newspapers, a convent, and churches of seven denominations. The value of imports for the year ending June 30, 1874, was \$1,066,589; of exports, \$34,803.

SAINT CHARLES. I. A S. E. parish of Louisiana, bounded N. by Lake Pontchartrain, and intersected by the Mississippi river; area, about 340 sq. m.; pop. in 1870, 4,867, of whom 3,963 were colored. There are several lakes and bayous on its borders; the surface is generally level and the soil fertile in the higher parts. It is intersected by Morgan's Louisiana and Texas railroad, and the New Orleans, Mobile, and Texas railroad. The chief productions in 1870 were 129,564 bushels of Indian corn, 32,767 of sweet potatoes, 2,238,200 lbs. of rice, 207 bales of cotton, 3,914 hogsheads of sugar, and 247,120 gallons of molasses. There were 527 horses, 1,287 mules and asses, 258 sheep, and 505 swine; and 21 molasses and sugar establishments. Capital, St. Charles. **II.** An E. county of Missouri, bounded N. and N. E. by the Mississippi river and S. E. by the Missouri, and drained by Cuivre river and several creeks; area, about 480 sq. m.; pop. in 1870, 21,304, of whom 1,922 were colored. The surface is

varied, occupied in part by a range of highlands, and the soil fertile. There are extensive coal mines. It is traversed by the St. Louis, Kansas City, and Northern railroad. The chief productions in 1870 were 760,980 bushels of wheat, 968,161 of Indian corn, 278,235 of oats, 16,143 of barley, 97,623 of potatoes, 6,882 tons of hay, 146,754 lbs. of tobacco, 41,003 of wool, 158,268 of butter, and 5,704 gallons of sorghum molasses. There were 5,788 horses, 1,815 mules and asses, 4,863 milch cows, 7,146 other cattle, 10,527 sheep, and 31,393 swine; 6 manufacturing of brick, 18 of carriages and wagons, 2 of furniture, 1 woollen mill, and 9 flour mills. Capital, St. Charles.

SAINT CHARLES, a city and the county seat of St. Charles co., Missouri, on the left or N. bank of the Missouri river, and on the St. Louis, Kansas City, and Northern railroad, 22 m. N. W. of St. Louis; pop. in 1850, 1,498; in 1860, 3,239; in 1870, 5,570, of whom 434 were colored; in 1875, about 7,500. The river is here crossed by a magnificent iron bridge for railroad and ordinary travel, completed in 1871 at a cost of \$1,750,000. There are seven river spans, and the entire length, including the viaduct approaches, is 6,535 ft. The city is lighted with gas and has a good fire department. The trade is considerable, and the manufactures are of some importance, the principal establishments being a foundry and machine shop, six flouring mills, two woollen mills, a furniture factory, a car factory, a starch factory, two tobacco factories, a broom factory, a plough factory, and five cooper shops. There are a national bank, two savings banks, a mutual fire insurance company, and a pork-packing establishment. Besides three public schools and several parochial schools of different denominations, the principal educational institutions are St. Charles college, the Lindenwood female college, and the convent of the Sacred Heart (female). St. Charles college was organized in 1836 and chartered in 1838, and is under the control of the Methodist Episcopal church, South. It was closed during the civil war, but has since been maintained as a high school. Four weekly newspapers (two German) and a monthly periodical are published. There are 11 churches, viz.: Baptist, Episcopal, Evangelical Protestant, German Evangelical, German Evangelical Lutheran, German Methodist, Methodist Episcopal, South, Presbyterian (2), and Roman Catholic (2).—St. Charles is one of the oldest settlements in Missouri, a post having been established here under Spanish authority by Louis Blanchette in 1769. It was incorporated as a town in 1809 and as a city in 1849.

SAINT CHRISTOPHER, an island of the British West Indies, often called St. Kitt's, in the Leeward group, separated from Nevis on the southeast by a strait 2 m. wide; length 23 m., breadth of its main body nearly 5 m.; area, 67 sq. m.; pop. in 1871, 24,440. A range of mountains traverses the island from S. E. to N. W.; the highest is Mt. Misery, over 4,000

ft. The skirts of the mountains, the higher parts of which are wooded, together with the valley of Basseterre, form the arable portion of the island, and are devoted mainly to sugar. The government consists of a president, an executive council appointed by the crown, and a legislative assembly, half of whose members are elected. Nevis has been recently united with St. Christopher for the purposes of executive government. In 1869 the imports were valued at £198,712; exports, £222,712. Capital, Basseterre.—St. Christopher was settled by English colonists under Sir Thomas Warner in 1623, was held afterward by the English and French, and finally was ceded to Great Britain by the treaty of Versailles in 1783. In 1872 it joined the confederation of the Leeward Islands, the legislature of which sits at St. John's, Antigua, and Basseterre in alternate years.

SAINT CLAIR, a lake lying between Michigan and Ontario, Canada, 30 m. long, with a mean breadth of 12 m., at its widest part 20 m.; area, 360 sq. m.; mean depth, 20 ft. It is 6 ft. higher than Lake Erie, which, according to J. T. Gardner's calculations (United States survey reports, 1873), is 573 ft. above the sea. Through St. Clair river, about 40 m. long and $\frac{1}{2}$ m. wide (which forms a part of the boundary between the United States and British America), it receives the waters of Lakes Huron, Superior, and Michigan, which it discharges through the Detroit river into Lake Erie.

SAINT CLAIR. I. A N. E. county of Alabama, bounded E. and S. E. by Coosa river; area, about 700 sq. m.; pop. in 1870, 9,360, of whom 2,065 were colored. It is mountainous, and has large forests of oak and other timber and a good soil. Extensive beds of bituminous coal are worked. It is traversed by the Alabama and Chattanooga railroad. The chief productions in 1870 were 29,778 bushels of wheat, 157,268 of Indian corn, 7,895 of oats, 1,293 lbs. of tobacco, 4,451 of wool, 1,244 bales of cotton, and 3,547 gallons of molasses. There were 970 horses, 452 mules and asses, 1,621 milch cows, 622 working oxen, 1,922 other cattle, 3,578 sheep, and 8,775 swine. Capital, Ashville. II. An E. county of Michigan, lying on Lake Huron, St. Clair river, and Lake St. Clair, which separate it from Canada, drained by Bell and Black rivers, and traversed by several railroads; area, about 900 sq. m.; pop. in 1870, 36,661. The surface is rolling, and much of it is heavily timbered with pine and other trees. The soil is fertile in the south and sandy in the north and west. The chief productions in 1870 were 224,242 bushels of wheat, 102,066 of Indian corn, 368,034 of oats, 210,848 of potatoes, 39,477 tons of hay, 128,020 lbs. of wool, 663,610 of butter, and 46,660 of hops. There were 6,398 horses, 8,014 milch cows, 9,922 other cattle, 32,587 sheep, and 9,438 swine; 19 manufactories of carriages and wagons, 13 of clothing, 3 of iron castings, 10 of tanned and curried leather, 3 of machinery, 5 of sash,

doors, and blinds, 1 of woollen goods, 6 flour mills, 20 saw mills, and 7 breweries. Capital, Port Huron. III. A S. W. county of Illinois, lying on the Mississippi river, opposite St. Louis, drained by Kaskaskia river and Cahokia, Silver, and Richland creeks, and intersected by several railroads; area, 630 sq. m.; pop. in 1870, 51,068. The surface is undulating and the soil very fertile. Along the Mississippi are rich coal mines. The chief productions in 1870 were 1,565,071 bushels of wheat, 1,423,121 of Indian corn, 476,851 of oats, 48,192 of barley, 265,169 of potatoes, 10,438 tons of hay, 5,347 lbs. of wool, 336,362 of butter, and 44,711 gallons of wine. There were 8,457 horses, 2,565 mules and asses, 6,338 milch cows, 4,616 other cattle, 3,782 sheep, and 29,785 swine; 36 manufactories of agricultural implements, 14 of brick, 61 of carriages and wagons, 21 of cooperage, 10 of cabinet furniture, 3 of wrought iron, 3 of castings, 4 of machinery, 4 of malt, 1 of vegetable oil, 1 distillery, 14 breweries, 3 planing mills, 4 saw mills, 18 flour mills, and 2 woollen mills. Capital, Belleville. IV. A W. county of Missouri, intersected by Osage river and drained by Sac river; area, 650 sq. m.; pop. in 1870, 6,742, of whom 152 were colored. The surface is varied, partly prairie and partly timber, and the soil tolerably fertile. It is traversed by the Sedalia division of the Missouri, Kansas, and Texas railroad. The chief productions in 1870 were 35,060 bushels of wheat, 200,368 of Indian corn, 56,186 of oats, 3,766 tons of hay, 2,410 lbs. of tobacco, and 10,376 of wool. There were 2,284 horses, 2,137 milch cows, 5,204 other cattle, 5,773 sheep, and 8,433 swine. Capital, Osceola.

SAINT CLAIR, a borough of Schuylkill co., Pennsylvania, on both sides of Mill creek (crossed by several bridges), a tributary of the Schuylkill river, and on the Philadelphia and Reading railroad, 3 m. N. of Pottsville; pop. in 1870, 5,726. It is on level ground, surrounded by hills under which are inexhaustible beds of anthracite. It is supplied with pure water from a large reservoir among the mountains 5 m. to the north. On the border the largest coal works in the world are in course of erection, to be completed in two or three years. Here the Primrose vein, 13 ft. thick, has been struck at a depth of 1,600 ft. Tunnelling for the Mammoth vein, which is expected to be from 40 to 50 ft. thick, is to begin at once (1875). The borough contains a blast furnace, a shovel factory, a manufactory of squibs (used in blasting), three public school buildings, a weekly newspaper, and 11 churches.

SAINT CLAIR, a city of St. Clair co., Michigan, on the St. Clair river, at the mouth of Pine river, 45 m. N. N. E. of Detroit; pop. in 1870, 1,790; in 1874, 2,003. A branch of the Canada Southern railway terminates at Court-right on the Canada side of the river. The Michigan Midland and Canada railroad extends W. to Ridgeway on the Grand Trunk railway. St. Clair contains two saw mills, an exten-

sive woollen mill, a large tannery, two flouring mills, a shingle mill, a large carriage factory, a foundry, two large brick yards, and two ship yards. It is the most extensive hay-shipping point in the northwest. There are a national bank, a union school, a weekly newspaper, and five churches. It was incorporated in 1858.

SAINT CLAIR, Arthur, an American general, born in Thurso, Scotland, in 1734, died near Greensburg, Pa., Aug. 31, 1818. He was a grandson of the earl of Roslyn, was educated at the university of Edinburgh, and studied medicine under John Hunter, but entered the army as an ensign, and came to America with Admiral Boscawen. He served under Amherst at Louisburg, and under Wolfe at Quebec. In 1762 he resigned his commission, and in 1764 settled in the Ligonier valley, Pennsylvania, where he erected mills, and held several important civil offices. In January, 1776, he was created a colonel in the continental army, and in August a brigadier general, and was in the battles of Trenton and Princeton. In 1777 he was made a major general and commanded Ticonderoga, but was compelled to evacuate it before Burgoyne. For this he was tried by court martial, but acquitted. In 1781 he remained at Philadelphia to protect congress while Washington marched to Yorktown, but joined the main army before Cornwallis surrendered. In 1786 he was sent to congress, of which he became president in 1787. When in 1789 the government of the Northwest territory was organized, he was made governor, and held that post till 1802. In 1791 he became commander-in-chief of the army operating against the Miami Indians. He was surprised on Nov. 4, near the Miami villages, and his force cut to pieces. Washington refused a court of inquiry, and St. Clair resigned; but congress appointed a committee of investigation, which exonerated him.

SAINT CLOUD, a city and the county seat of Stearns co., Minnesota, on the W. bank of the Mississippi river, 67 m. in a direct line and 100 m. by the course of the river N. W. of St. Paul; pop. in 1870, 2,161; in 1875, about 2,800. It is connected with St. Paul by the first division of the St. Paul and Pacific railroad, which continues N. up the Sauk valley. Another railroad up the Mississippi, intersecting the Northern Pacific 65 m. distant, is graded (1875). Steamers ply in summer to the falls of St. Anthony at Minneapolis. The city is surrounded by a country unexcelled for grain growing and stock raising. A rapid in the Mississippi here affords one of the best water powers in the country, and a company organized for the purpose is improving it. Some of the manufactories are now run by steam. There are two saw mills, two flouring mills, two planing mills, and sash, door, and blind factories, an iron and brass foundry, one large and three smaller furniture manufactories, a plough factory, four wagon factories, marble works, brick yards, potter-

ies, &c. In the immediate vicinity are several beds of superior granite, which is cut in the city, and shipped to Chicago and other points. St. Cloud contains a fine brick court house, a large hotel, two banks, one of the state normal schools, two graded public schools, four weekly newspapers (one German), and seven churches.

SAINT-CLOUD, a town of France, in the department of Seine-et-Oise, on the left bank of the Seine, 2 m. W. of the *enceinte* of Paris; pop. about 5,000. It received its name from a monastery built by Clodoald, a grandson of Clovis. In the royal palace here, which was originally a country house, Henry III. was assassinated in 1589. The duke of Orleans, brother of Louis XIV., added a magnificent park and gardens, and the place became celebrated for sumptuous entertainments and historical associations. Marie Antoinette, Napoleon I., Louis XVIII., Charles X., Louis Philippe, and Napoleon III. successively resided at St. Cloud. The overthrow of the first republic was initiated here by Bonaparte on the 18th Brumaire (1799). The capitulation of Paris in 1815 and the ordinances of Charles X. were signed here. The palace was almost entirely burned during the siege of Paris in October, 1870, though many works of art were saved.

SAINT CROIX. **I.** A river, also called Passamaquoddy and Schoodic, which forms a portion of the N. E. boundary between the United States and British America. It rises in Grand lake, and flows in a very winding course, though generally S. S. E. for about 125 m., separating Maine from New Brunswick, and falling into Passamaquoddy bay. It is navigable to St. Stephen, N. B., about 20 m. from its mouth. **II.** A river of Wisconsin, rising in Douglas co., near the W. part of Lake Superior, and flowing S. W. to the E. line of Minnesota, where it becomes the boundary between that state and Wisconsin. Its general direction in this part of its course is S., and it falls into the Mississippi, 38 m. below St. Paul. Its whole length is about 200 m., and its width at its mouth 100 yards. An expansion in the lower part of its course, for about 36 m., is called St. Croix lake. The river has several fine falls.

SAINT CROIX, a N. W. county of Wisconsin, separated by the St. Croix river from Minnesota, and drained by Willow, Apple, and Rush rivers; area, 750 sq. m.; pop. in 1870, 11,016. The surface is uneven, and most of it covered with pine forests. It is traversed by the West Wisconsin and the North Wisconsin railroads. The chief productions in 1870 were 823,678 bushels of wheat, 42,461 of Indian corn, 447,775 of oats, 27,664 of barley, 61,972 of potatoes, 7,058 tons of hay, 3,343 lbs. of wool, 229,615 of butter, and 4,200 of hops. There were 3,032 horses, 3,232 milch cows, 4,085 other cattle, 1,435 sheep, and 3,481 swine. Capital, Hudson.

SAINT CROIX, a West India island. See SANTA CRUZ.

SAINT-CYR, a village in the park of Versailles, 9 m. S. W. of Paris, celebrated for the female seminary (*maison de St. Cyr*) built here in 1686, after the designs of Mansard, by Louis XIV., under the auspices of Mme. de Maintenon, for the education of 250 daughters of the nobility. For this school, at the request of Mme. de Maintenon, Racine wrote *Athalie*; and she made it her home after the death of Louis XIV. The school was converted in 1793 into a military hospital, and in 1806 the military academy of Fontainebleau was transferred to it by Napoleon. This academy became known as *Vécole spéciale militaire de St. Cyr*, and is still the principal institution for training officers for the army and navy.

SAINT-CYR, Laurent Gouvion. See **GOUVION SAINT-CYR**.

SAINT-DENIS, a town of France, in the department of the Seine, 2 m. N. of the *enceinte* of Paris; pop. in 1872, 31,993. Dagobert I. built here, over the grave of St. Denis, an abbey which soon became the richest in France. One of its manors was held in fief by some of the early Capetians, who adopted as their standard the *oriflamme*, originally the banner of the convent, and chose the crypt of the church as their burial place. In 1793, by order of the convention, the tombs of the kings were destroyed and their remains removed. The church, restored by Napoleon and subsequent governments, ranks among the best specimens of Gothic art. The convent is occupied by a school for female orphans of members of the legion of honor.

SAINT DOMINGO. See **HAYTI**, and **SANTO DOMINGO**.

SAINTE-ALDEGONDE. See **ALDEGONDE**.

SAINTE-BEUVE, Charles Augustin, a French author, born in Boulogne, Dec. 23, 1804, died in Paris, Oct. 13, 1869. His mother, a woman of English descent, instructed him in the English language and literature. He completed his studies at Charlemagne and Bourbon colleges, Paris, studied medicine, and was attached to the hospital of St. Louis till 1827. He began his literary career about 1824 as a writer for the *Globe*. In 1828 he became known as a critic by his *Tableau historique et critique de la poésie française et du théâtre français au XVI^e siècle* (enlarged ed., 1843). He subsequently published poetry which was bitterly assailed by the adherents of the classical school. The revolution of July transferred the *Globe* to the St. Simonians, whose doctrines he then advocated; but he soon joined the newly established *Revue des Deux Mondes* and his friend Armand Carrel's *National*. In 1837 he delivered lectures at Lausanne, which formed the groundwork of his history of Port Royal. In 1840 he received from Thiers an office in the Mazarin library, which enabled him to complete that work. He was elected to the French academy in 1845. In 1848-'9 he gave lectures at Liège on *Chateaubriand et son groupe littéraire sous l'empire* (2 vols., 1860). He returned

to Paris in 1850 as a partisan of Louis Napoleon, connected himself with the *Constitutionnel*, and early in 1852 with the *Moniteur*. In the former appeared his *Causeries du Lundi*. He was then also appointed professor of Latin poetry in the collège de France, but the students hissed him on account of his imperialism, and he at once resigned. From 1857 to 1861 he was *maître de conférences* at the normal school. In 1865 he became a member of the senate, where his support of Renan made him obnoxious to the ultramontanes. As a subtle, discriminating, and impartial critic, he had no superior, and his originality and occasional partiality for the phraseology of the 16th century made Balzac say that he had invented a new language which should be called *le Sainte-Beuve*. He was equally remarkable for his intimate sympathy with the brilliant women and men who in previous periods adorned French society and literature, for his keen analysis of character, and for his rich store of anecdotes. His works include *Critiques et portraits littéraires* (5 vols., 1832-'9); *Volupté*, a rather pathological and singular novel (1834; 5th revised ed., 1861); *Poésies complètes* (1840; enlarged ed., 2 vols., 1863); *Port-Royal* (5 vols., 1840-'60; 3d ed., 6 vols., 1867); *Portraits littéraires* (2 vols., 1844; new ed., 3 vols., 1864); *Portraits de femmes* (1844; new ed., 1855); *Portraits contemporains* (2 vols., 1846; new ed., 3 vols., 1855); *Causeries du Lundi* (15 vols., 1851-'62); *Galerie des femmes célèbres* (1858), and *Nouvelle galerie des femmes célèbres* (1864), both extracted from the preceding, and translated into English by Harriet W. Preston under the title of "Portraits of Celebrated Women" (Boston, 1868); *Nouveaux Lundis* (10 vols., 1863-'8); *Madame Desbordes-Valmore, sa vie et sa correspondance* (1870; translated by Harriet W. Preston, Boston, 1872); and the posthumous *Causeries du Lundi* (3 vols., 1875; "English Portraits," selected from the same, London, 1875).

SAINTE-CLAIRE DEVILLE. See **DEVILLE**.

SAINTE GENEVIEVE, an E. S. E. county of Missouri, bounded N. E. by the Mississippi river, and drained by Rivière aux Vases, Isle au Bois, Saline, and Establishment creeks; area, about 400 sq. m.; pop. in 1870, 8,384, of whom 431 were colored. The surface is broken and hilly. There are quarries of marble, and valuable mines of lead and copper. The chief productions in 1870 were 155,228 bushels of wheat, 180,350 of Indian corn, 78,197 of oats, 5,970 lbs. of tobacco, and 10,327 of wool. There were 1,967 horses, 1,805 milch cows, 3,632 other cattle, 4,997 sheep, and 11,066 swine. Capital, Ste. Genevieve.

SAINT ELIAS, Mount, a volcanic peak on the border of Alaska and British America, lat. 60° 15' N., lon. 141° W. Its height has been variously estimated at 16,000 to 18,000 ft. More recently Dall from trigonometric calculation estimates it at 19,000 ft., which is higher than any other peak in North America.

SAINT-ELME, *Ida*, the *nom de plume* of a French courtesan (ELSELINA VANAYL DE YONGH), born at Valambrose, S. France, in 1778, died in Brussels, May 23, 1845. She is known chiefly by her publication entitled *Mémoires d'une contemporaine* (8 vols., Paris, 1827; new ed., 1863), purporting to contain her recollections of eminent personages under the republic, the consulate, the empire, and the restoration. As the mistress of several of Napoleon's generals and marshals, she professed to have peculiar materials of secret history. After the revolution of 1830 she resided in London, and made an attempt to levy blackmail upon Louis Philippe by forcing him to purchase letters written by him in 1809. She ended her life in a hospital of nuns.

SAINTE-MARGUERITE. See LÉRINS ISLANDS.

SAINTE (anc. *Santonnes*), a town of France, in the department of Charente-Inférieure, on the right bank of the Charente, 36 m. N. W. of La Rochelle; pop. in 1872, 9,998. It has many Roman antiquities, and a renovated cathedral which originated with Charlemagne. The crypt of the church of St. Eutrope forms the largest subterranean chapel in France. The trade is chiefly in wine, brandy, and grain. It is of great antiquity, and was one of the principal cities of Aquitania. In the middle ages it was the capital of the province of Saintonge. It suffered much during the religious wars.

SAINT-ÉTIENNE, a town of France, capital of the department of Loire, on the Furens, a branch of the Loire, 32 m. S. W. of Lyons; pop. in 1872, 110,814. It has several spacious streets lined with substantial houses built of freestone, originally white, but soiled from coal smoke. Among the churches, St. Étienne and Notre Dame are most noteworthy, and other public buildings are the town hall, theatre, museum of industry, gallery and school of fine arts, school of mines, and communal college. It was a place of some importance in the 15th century, and in recent times has become one of the principal manufacturing centres in Europe. It owes its recent rapid rise to the water power furnished by the Furens, and its situation in the midst of the most productive coal fields of France. The ribbon manufacture, the largest in the world, employs 40,000 weavers in the town and adjacent districts, and produces goods to the value of 80,000,000 francs per annum. The firearms factories employ 6,000 men, and in 1868 turned out 90,000 pieces, and the national arms factory, employing 4,500 men, made in 1868 200,000 Chassepot rifles. Sixty cutlery establishments employ 7,000 workmen and produce goods to the value of about 3,500,000 francs annually. The manufacture of Bessemer and Martin steel is extensive. Hemp cables for mines and inclined railway planes are made. Of coal about 500,000 tons a year are exported.

SAINT EUSTATIUS, an island of the West Indies, belonging to the Netherlands, in the Lee-

ward group, 12 m. N. W. of St. Christopher; area, about 8 sq. m.; pop. about 2,200. The N. part is broken into rugged hills from 500 to 900 ft. high; the S. is occupied by an extinct volcano, the summit of which is 1,950 ft. high. The climate is warm, but healthful. The soil is fertile, but covered with a wilderness of weeds; the chief product is yams, besides which the sugar cane is cultivated, yielding an average of 30,000 lbs. of sugar per annum. Orange, the chief town, is on the S. W. side, built partly on a small beach and partly on a steep cliff 130 ft. high; this cliff is composed of white argillaceous earth, which makes excellent cement for subaqueous as well as ordinary works. The only accessible point is on the beach under the town, and here the surf is dangerous. The landing is defended by a fort and several batteries. It has been a Dutch colony since about 1635, but was several times taken by the French and English, and the English language is spoken. It was at one time a place of great importance, being the seat of an extensive contraband trade, and the population in 1780 was 25,000; but it now has little trade.

SAINT-ÉVREMOND, Charles de Marguetel de Saint-Denis, seigneur de, a French author, born near Coutances, April 1, 1613, died in London, Sept. 20, 1703. He early acquired military and social distinction, but gave offence to Mazarin while holding a high command in which he amassed a fortune, and was imprisoned for three months in the Bastille. In 1661 he was banished for disparaging the treaty of the Pyrenees. In London, where he passed the rest of his life, he became an oracle in fashionable and political society, and Charles II. gave him a pension of £300. His principal works are: *Comédie des académistes* (1650); *Réflexions sur les divers génies du peuple romain* (1664); *Jugements et observations sur Sénèque, Plutarque, &c.*; and minor essays and dissertations on ancient and modern tragedy and ancient poetry. The first authentic edition of his works was partly prepared by himself and Des Maizeaux, and finished by the latter in conjunction with Silvestre (3 vols., London, 1705, with an English translation and biographical notice). A select edition was published in 1804 by Desessarts.

SAINT FRANCIS, an E. county of Arkansas, drained by the St. Francis and L'Anguille rivers; area, about 625 sq. m.; pop. in 1870, 6,714, of whom 2,446 were colored. The surface is nearly level, and the soil productive. It is intersected by the Memphis and Little Rock railroad. The chief productions in 1870 were 141,911 bushels of Indian corn, 8,850 of sweet and 2,440 of Irish potatoes, and 3,757 bales of cotton. There were 1,014 horses, 659 mules and asses, 1,662 milch cows, 368 working oxen, 2,449 other cattle, 924 sheep, and 8,060 swine. Capital, Madison.

SAINT FRANCIS RIVER. See ARKANSAS, vol. i., p. 714.

SAINT FRANÇOIS, an E. S. E. county of Missouri, drained by the Big river, a branch of the Maramec, and the sources of the St. Francis; area, 350 sq. m.; pop. in 1870, 9,742, of whom 518 were colored. The surface is broken and hilly, and includes a portion of the Iron mountain. It has extensive iron works. It is traversed by the St. Louis and Columbus and the St. Louis and Texas divisions of the St. Louis and Iron Mountain railroad. The chief productions in 1870 were 63,632 bushels of wheat, 247,581 of Indian corn, 125,803 of oats, 3,083 tons of hay, 9,490 lbs. of tobacco, 20,460 of wool, 66,133 of butter, and 12,354 of sorghum molasses. There were 1,927 horses, 732 mules and asses, 1,945 milch cows, 512 working oxen, 2,921 other cattle, 9,459 sheep, and 17,217 swine. Capital, Farmington.

SAINT GALL (Ger. *Sanct-Gallen*). I. A N. E. canton of Switzerland, bounded N. by Thurgau, N. E. by the lake of Constance, E. by the Rhine, which separates it from Vorarlberg and Liechtenstein, S. by Glarus, and W. by the lake of Zürich; area (exclusive of the canton of Appenzell, which it entirely encloses), 780 sq. m.; pop. in 1870, 191,015, nearly all Germans, and two thirds Roman Catholics. It is watered by tributaries of the Rhine, including the Thur, the Sitter, and the Necker. Lake Wallen is almost entirely in this canton. The S. part of the canton is one of the lofty Alpine regions of Switzerland, Mounts Scheibe, Graue Hörner, and Speerberg being within its limits. The whole surface of the canton is mountainous. The soil is generally fertile. The mountainous districts are covered with wood or rich pasture, and on the lower slopes are vineyards and orchards. The most important manufacture is that of cotton. The government is democratic. The great council is composed of 88 Catholics and 62 Protestants, elected for two years, and meeting twice a year. The executive council is composed of seven members, chosen by the great council from their own number and holding office four years. The canton was admitted to the confederation in 1803. It is divided into 15 districts. The constitution of 1861 made the church virtually independent of the state, and the latter controls education. II. A city, capital of the canton, on the Steinach, a branch of the Sitter, 43 m. E. of Zürich; pop. in 1870, 16,676. The suburbs are finely laid out, and command beautiful views. It is the centre of the manufacture of muslins and of the trade of N. E. Switzerland. The principal buildings are the cathedral, the restored Gothic church of St. Lawrence, and the new school house with a large library and museum. The city grew up around an abbey built by St. Gall in the 7th century. (See GALL.) It was received into the Helvetic confederation in 1454. The abbey was secularized in 1805; it is now the residence of the bishop, and contains an extensive library, remarkable for old German manuscripts.

SAINT-GERMAIN, or *St. Germain-en-Laye*, a town of France, in the department of Seine-et-Oise, 8 m. W. of the *enceinte* of Paris; pop. in 1872, 22,862. It was long a royal residence, and is now a fashionable summer resort. James II. of England died here. The revolution converted the palace into barracks; Napoleon I. made it a military prison, and Napoleon III. a museum of antiquities. Adjoining it is one of the largest forests in France.

SAINT-GERMAIN, *Count de*, a cosmopolitan adventurer of the 18th century, of unknown origin. He arrived in Paris about 1740, in company with the marshal de Belle-Isle, and created a prodigious sensation by his conversational powers, by his knowledge of chemistry and history, and by his unaccountable possession of diamonds of great value. The most fabulous stories were circulated about him, and his graphic and familiar delineations of personages long dead gave an impression that he had been their contemporary. For many years he was a favorite at court and in the highest society in Paris. He is said to have ended his life at the court of the landgrave of Hesse-Cassel. Voltaire called his life, in allusion to his title of count and to his stories (*contes*), *ce conte pour rire*. He is supposed to have been really a spy in the pay of various governments.

SAINT GOTHARD. See ALPS, vol. i., pp. 352 and 354. **Tunnel**. See supplement.

SAINT HELENA, an E. parish of Louisiana, bounded W. by the Amite river and drained by the Tickfah river and Natalbany creek; area, about 450 sq. m.; pop. in 1870, 5,423, of whom 2,914 were colored. The surface is gently undulating, and the soil fertile, especially along the streams. The chief productions in 1870 were 91,265 bushels of Indian corn, 38,961 of sweet potatoes, 3,875 lbs. of wool, and 3,284 bales of cotton. There were 807 horses, 1,823 milch cows, 3,999 other cattle, 1,858 sheep, and 8,977 swine. Capital, Greensburgh.

SAINT HELENA, an island belonging to Great Britain, in the S. Atlantic ocean, about 1,200 m. W. of Africa and 2,000 m. E. of South America; lat. 15° 57' S., lon. 5° 42' W.; area, about 47 sq. m.; pop. in 1871, 6,241, including natives of mixed European and Asiatic origin, west African negroes, and whites (government officials, the garrison, merchants, and farmers). Rugged and precipitous cliffs from 600 to 2,000 ft. high encircle the island. The principal inlets are James's bay, having an excellent harbor, on which is Jamestown, Rupert's and Lemon valley on the N. W., and Sandy bay on the S. E. side, all fortified. There are narrow ravines where landing is possible, which are also protected by small forts built during Napoleon's imprisonment, but now mostly unoccupied, as the entire garrison in 1874 numbered but 191 men. The island is of volcanic origin. From a crater on the S. side lava and other volcanic matters have flowed in every direction, the other side having, it is supposed, sunk into the ocean. A lofty ridge of calcareous rocks,

running nearly E. and W. with a bend to the S. at each extremity, intersects the island, and in this range are Diana's peak, 2,700 ft. high, Cuckold's point, 2,672 ft., and Halley's mount, 2,467 ft. The Flagstaff, 2,272 ft., and Barns-cliff, 2,015 ft., are prominent cliffs on the coast. Along the S. coast are many remarkable columns or basaltic rocks, two of which, Lot and Lot's Wife, are respectively 197 and 160 ft. high, and the Chimney, a noted hexagonal column, is 64 ft. Iron, gold, and copper have been found in small quantities. The climate is temperate and salubrious, and not unhealthy to European constitutions. The range of the thermometer is from 57° to 72°, the annual average 66°. The flora is interesting, though of more than 700 species but 52 are native. When the island was discovered it was covered with trees, which are now nearly destroyed. The vegetation is almost wholly European. There are several plains, the largest, Longwood, comprising 1,500 acres; but in a total area of about 30,000 acres not more than 500 are cultivated, and less than 8,000 are devoted to grazing. The soil is good and might be made productive, but almost every article of food or clothing is imported. Rice is brought from India, and with fish, which is abundant, forms the staple food of the poorer classes. The island never had any internal sources of income, but formerly it imported supplies for ships to and from India, and for whaling vessels; but the trade to the East is now almost entirely diverted through the Suez canal, and whaling vessels are rarely seen. It was made a crown colony in 1833, with a governor and other officers under the control of the home government. Its revenue from customs and taxes is not more than £15,000, and its total annual cost to the government is about £55,000, including a military expenditure of about £23,000.—The island was discovered on St. Helena's day, May 21, 1502, by Juan de Nova Castella, a Spanish navigator in the service of the Portuguese, from whom it was at a later period taken by the Dutch. From about 1650 to 1672 it was alternately occupied by the Dutch and the English. In 1673 Charles II. granted it to the East India company. It was Napoleon's place of exile from Oct. 16, 1815, till his death, May 5, 1821. In 1840 his remains were removed to France, which in 1858 bought the house at Longwood occupied by him, and the valley where he was buried, and appointed a perpetual guard for them.—See "St. Helena," by John Charles Melliss (London, 1875).

SAINT-HÉLIER, a market town, seaport, and the capital of the island of Jersey in the English channel, on the S. coast; pop. in 1871, 30,756. It is situated at the base of an amphitheatre of low hills sloping to St. Aubin's bay. The Victoria and Albert piers enclose a spacious harbor defended by Fort Regent and Castle Elizabeth. Near Castle rock is the hermitage said to have been the retreat of St. Hélier,

from whom the town takes its name. There are several main thoroughfares intersected by narrow and irregular streets, but well paved and drained and lighted with gas. The principal buildings are the court house built in 1647, in which is the public library founded in 1736, and the college erected in commemoration of the queen's visit in 1846. There are seven parish churches, St. Hélier's dating from 1341, 14 other places of worship for different denominations, several schools and benevolent institutions, six banks, a theatre, and a market house. Ship building is an important industry, and there are several founderies and breweries. The coasting trade in oysters and fish is extensive, and the fisheries and Newfoundland trade employ about 10,000 tons of shipping and 1,500 hands. The mild climate and cheap living make the place a favorite resort.

SAINT-HILAIRE, Auguste de, a French botanist, born in Orleans, Oct. 4, 1799, died there, Sept. 30, 1853. He was auditor in the council of state in Paris, explored Brazil, and published *Flora Brasiliæ Meridionalis* (3 vols., Paris, 1825-'32), and other works, which procured his admission to the institute.

SAINT-HILAIRE, Geoffroy. See GEOFFROY SAINT-HILAIRE.

SAINT-HILAIRE, Jules. See BARTHÉLEMY SAINT-HILAIRE.

SAINT-HILAIRE, Marco de, the pseudonyme of ÉMILE MARC HILAIRE, a French writer, born about 1790. At an early age he became one of the pages of Napoleon I., and afterward engaged in book making as a profession. His best known works are: *Mémoires d'un page de la cour impériale* (2 vols. 8vo, 1830); *Souvenirs de la vie privée de Napoléon* (1838); *Histoire populaire de Napoléon et de la grande armée* (large 8vo, illustrated, 1842); *Histoire de la garde impériale* (large 8vo, illustrated, 1845-'7); *Histoire de la campagne de Russie* (4 vols. 8vo, illustrated, 1846-'8); *Histoire des conspirations et exécutions politiques* (4 vols. large 8vo, illustrated, 1849), including France, England, Spain, and Russia; a continuation to 1850 of Anquetil's *Histoire de France* (1853); and *Histoire de Napoléon III.* (8vo, 1853).

SAINT HYACINTHE. I. A S. W. county of Quebec, Canada; area, 263 sq. m.; pop. in 1871, 18,810, of whom 18,075 were of French origin or descent. It lies between the Yamaska river on the east and the Richelieu on the west, and is traversed by the Grand Trunk railway. **II.** A city, capital of the county, on the W. bank of the Yamaska river, and on the Grand Trunk railway, 35 m. E. by N. of Montreal; pop. in 1871, 3,746. Steamers run daily in the season of navigation to St. Césaire, a village 20 m. above. The principal public buildings are the court house, city hall and market, Roman Catholic cathedral, bishop's palace, hospital and convent of gray nuns, and St. Hyacinthe college. The college is a fine building of cut stone, 700 ft. long. There are

manufactories of woollens, wooden ware, leather, lace, organs, iron castings, mill machinery, and boots and shoes, a grist and saw mill, a bank, a branch bank, several hotels, a telegraph office, a tri-weekly and two weekly newspapers, and a monthly periodical. One of the weeklies is published in English; the other publications are in French.

SAINTINE, the pseudonyme of **JOSEPH XAVIER BONIFACE**, a French author, born in Paris, July 10, 1798, died there, Jan. 21, 1865. He early won academical prizes for his poetry, and in 1837 the Montyon prize of 3,000 francs for his story of *Picciola* (37th ed., revised, 1861), which has been translated into many languages. He published many other stories, novels, and miscellaneous works, and (under the name of Xavier) hundreds of plays, the last in conjunction with other dramatists. Mrs. Wood (Anne T. Wilbur) published "The Solitary of Juan Fernandez, or the real Robinson Crusoe" (Boston, 1851), a translation of Saintine's *Sœur!* and "The Queen of the Danube" (1859), from his *Trois reines, chronique du XV^e siècle*; and Schele de Vere a translation of his *Mythes du Rhin* (London, 1874), with illustrations by Doré.

SAINT JAMES, a S. E. parish of Louisiana, having Lake Maurepas on the northeast and intersected by the Mississippi; area, 330 sq. m.; pop. in 1870, 10,152, of whom 6,877 were colored. The surface is level and the soil fertile. The plantations are chiefly on the river. It is intersected by the New Orleans, Mobile, and Texas railroad. The chief productions in 1870 were 91,105 bushels of Indian corn, 3,450 lbs. of tobacco, 934,915 of rice, 3,041 bales of cotton, 6,265 hogsheads of sugar, and 347,722 gallons of molasses. There were 66 molasses and sugar establishments. Capital, Couvent.

SAINT JEAN D'ACRE. See **ACRE**.

SAINT JOHN, a river of North America, called by the Indians Looshtook (Long river), which rises, under the name of the S. W. branch, in the highlands that separate Maine from Quebec, Canada, at the Metjarquette portage. It flows N. E. to the junction of the St. Francis, about 150 m., for 100 m. of which, commencing at the junction of the N. W. branch, it is known as the Walloostook. From the mouth of the St. Francis it flows E. N. E. and then S. E. to the Grand falls, where it has a perpendicular descent of 70 or 80 ft., thence nearly S. to lat. 46°, when it turns suddenly and flows E. for 100 m. to the entrance of the outlet of Grand lake, thence in a broad channel due S. to Kingston, then S. S. W. to Westfield, and finally S. E. to the bay of Fundy at St. John. Its whole course is about 450 m.; of this 225 m. of the lower portion is wholly within British territory; 75 m. from the Grand falls to the St. Francis forms the boundary between Maine and New Brunswick; the next 112 m. is in Maine; and from its source to lat. 46° 25' N., lon. 70° 4' W., 38 m., it forms the boundary between Maine and Que-

bec. It has 11 principal affluents, the largest being the Alleguash, St. Francis, Madawaska, and Aroostook. It is navigable for vessels of 120 tons to Fredericton, 84 m. from its mouth; small steamboats ascend to Woodstock, 75 m. further, and even at times to the Grand falls, 225 m. from its mouth; above this point it is navigated by steamboats 40 m., to the mouth of the Madawaska. It affords a vast water power. With its branches it furnishes 1,300 m. of navigable waters, and drains 17,000,000 acres, of which 9,000,000 are in New Brunswick, 2,000,000 in Quebec, and 6,000,000 in Maine.

SAINT JOHN, a lake of Canada. See **QUEBEC**, vol. xiv., p. 135.

SAINT JOHN, a S. county of New Brunswick, Canada, bordering on the bay of Fundy, and intersected by the St. John river; area, 585 sq. m.; pop. in 1871, 52,120, of whom 30,128 were of Irish, 13,772 of English, 5,785 of Scotch, 739 of German, 616 of African, 377 of Dutch, and 340 of French origin or descent. The surface is agreeably diversified and the soil fertile. The European and North American and the Intercolonial railways traverse the county. Capital, St. John.

SAINT JOHN, the chief city and seaport of New Brunswick, Canada, capital of St. John co., on a harbor of the same name, at the mouth of the river St. John in the bay of Fundy, 84 m. by the course of the river or 54 m. in a straight line S. S. E. of Fredericton, and 130 m. W. N. W. of Halifax, N. S.; lat. 45° 14' 6" N., lon. 66° 3' 30" W.; pop. in 1861, 27,317; in 1871, 28,805; in 1875, including suburbs, about 50,000. The greater portion of the city stands on a rocky peninsula projecting into the harbor on the E. side of the river. The site rises gradually from the harbor. The streets are wide, and chiefly laid out at right angles; some of them are very steep and cut through the solid rock to a depth of 30 or 40 ft. The buildings are principally of brick and stone, and there are many fine public edifices, the chief of which are the Roman Catholic cathedral, the provincial lunatic asylum, the city hospital, the court house and jail, the market house, the Carleton city hall, the opera house, the post office, the Victoria hotel, the marine hospital, the almshouse, the academy of music, the dramatic lyceum, the mechanics' institute, the skating rink, and the barracks. The Dominion penitentiary, a large granite building, is about a mile from the city, and about a mile and a half distant is the Rural cemetery, containing 110 acres. St. John is lighted with gas, and is supplied with water from Little river, 4 m. distant, by two iron pipes having a joint capacity of 5,500,000 gallons a day. Horse cars connect the city with Portland and Indian-town. On the W. side of the river is a portion of the city called Carleton. Adjoining the main portion of the city and practically part of it is the town of Portland (pop. in 1871, 12,520), which is well built, lighted with gas,

and supplied with water, and contains the residences of many St. John merchants, six churches, and several ship yards, saw mills, and founderies. St. John has communication with Halifax by the Intercolonial railway, and with Fredericton and Bangor, Me., by the European and North American railroad. Steamers run regularly to Fredericton and other points on the river, to St. Andrews and St. Stephen, to Annapolis, Yarmouth, and other points in Nova Scotia, and to Portland, Me., and Boston. The harbor is one of the finest in America, and is never blocked with ice. The entrance, about 2 m. S. of the city, is protected by Partridge island, on which are a quarantine hospital and a lighthouse with a light 166 ft. above the sea. The passage W. of the island has 10 ft. of water and that E. of it 16 ft., while abreast of the city there is from 8 to 22 fathoms. On the E. side of the channel below the city a breakwater has been constructed as a protection against southerly gales. There is a peculiar phenomenon at the entrance of the river into the harbor about $1\frac{1}{2}$ m. above the city; the stream, discharging an immense body of water, is forced through a rocky gorge, 160 yards wide and 400 long, and makes a fall of about 17 ft. The tide in the harbor rises ordinarily 21 ft., but at the vernal equinox 25 ft. At low water the waters of the river are about 12 ft. higher than those of the harbor, at high water 5 ft. lower, while for 15 or 20 minutes of each ebb and flow of the tide they are at the same level, during which vessels can pass the falls. Above the falls the tide seldom rises more than 4 ft. Spanning the gorge, about 100 ft. above low water, is a magnificent suspension bridge, 640 ft. long. The value of foreign commerce for the three years ending June 30, 1875, was as follows:

YEAR.	Imports.	Exports.
1873	\$8,118,758	\$4,107,550
1874	8,415,986	8,915,362
1875	8,312,753	8,642,895

The entrances during the last named year were 1,131, tonnage 377,614, of which 419, tonnage 122,567, were in ballast; clearances, 1,141, tonnage 443,981, of which 16, tonnage 6,535, were in ballast. The number of vessels belonging to the port on Jan. 1, 1875, was 807, with an aggregate tonnage of 263,401. The exports consist chiefly of lumber, which is shipped to Great Britain, the West Indies, and the United States. The manufactures of St. John are of considerable importance, the amount of capital invested, according to the census of 1871, being \$1,225,942; number of hands employed, 4,103; value of products, \$5,094,976. The number of ships built during the year ending Dec. 31, 1874, was 58, with an aggregate tonnage of 35,872. Among the other articles of manufacture are iron castings, nails, edge tools, lumber, leather, boots and shoes,

soap and candles, paper, cotton goods, rolling mill products, rope, hats, and carriages. There are two banks with a joint capital of \$2,000,000, three branch banks, a savings institution, and three banking firms. St. John is divided into nine wards, and is governed by a mayor, nine aldermen, and nine councilmen. It has a police force and a good fire department, with a fire alarm telegraph. There are several good hotels, three orphan asylums, an industrial school, a grammar and several common schools, several private or denominational schools and academies, a historical society, a natural history society, a young men's Christian association, four daily, one tri-weekly, and nine weekly newspapers, a bi-weekly periodical, and 31 churches, viz.: 5 Baptist, 1 Calvinistic Baptist, 1 Christian, 1 Congregational, 6 Episcopal, 2 Free Christian Baptist, 1 Methodist Episcopal, 6 Presbyterian, 1 Reformed Presbyterian, 2 Roman Catholic, and 5 Wesleyan Methodist.—St. John was founded by American loyalists who left the United States at the close of the revolution, and was created a city by royal charter in 1785.

SAINT JOHN, Henry. See BOLINGBROKE.

SAINT JOHN. I. James Augustus, an English author, born in Carmarthenshire, Sept. 24, 1801. He went to London at the age of 17, edited a newspaper at Plymouth, published a poem entitled "Abdallah," and became sub-editor with James Silk Buckingham of the "Oriental Herald." He afterward travelled in the East and resided abroad for many years, and while writing at Chantilly, France, his "History of the Manners and Customs of Ancient Greece" (3 vols. 8vo, London, 1842) became nearly blind. Among his other works are: "Description of Egypt and Nubia" (8vo, 1834); "History, Manners, and Customs of the Hindoos" (2 vols., 1834-'5); "Isis, an Egyptian Pilgrimage" (2 vols., 1852); "The Nemesis of Power: Forms and Causes of Revolutions;" "There and Back again in search of Beauty: Italy" (2 vols., 1853); "Philosophy at the Foot of the Cross" (1855); "History of the Four Conquests of England, Roman, Anglo-Saxon, Danish, and Norman" (2 vols., 1861); and "Life of Sir Walter Raleigh" (2 vols., 1868). He has also published four novels, entitled "Tales of the Ramad'han," "Margaret Ravenscroft," "Sir Cosmo Digby," and "Weighed in the Balance." **II. Percy Bolingbroke**, an English author, son of the preceding, born in Plymouth, March 4, 1821. He accompanied his father in his travels, and assisted him in the preparation of some of his works, and received from the Greek parliament a vote of thanks for his activity in the cause of the Greeks before the Crimean war. He also travelled in America. He has published "The Young Naturalist's Book of Birds" (London, 1844); "Three Days of the French Revolution" (1848); "Quadroona, or the Slave Mother" (1861); "The Creole Bride" (1864); and "Good as Gold" (1870). **III. Bayle**, an English

traveller, brother of the preceding, born in London, Aug. 9, 1822, died there, Aug. 1, 1859. His chief works are: "Adventures in the Libyan Desert;" "Manners and Politics in the Ottoman Empire;" "Two Years' Residence in a Levantine Family;" "Views in the Oasis of Siwah" (fol.); "The Subalpine Kingdom," containing some curious documents on the life of Rousseau; "Purple Tints of Paris: Sketches and Manners;" "The Turks in Europe" (1853); "The Louvre, or Biography of a Museum" (1855); "Legends of the Christian East" (1857); and "Montaigne the Essayist" (1857). **IV. Spenser**, brother of the preceding, born in London, Dec. 22, 1826. He studied the Malay language, and was for several years consul general in Borneo. In 1861 he became chargé d'affaires and subsequently minister to Hayti. He has published "Life in the Forests of the Far East" (London, 1862). **V. Horace Roscoe**, brother of the preceding, born in Normandy in 1830. He was editor for a time of the "London Leader," and with his brothers Bayle and Percy for a short time conducted the "Utopia." He has published "Life of Columbus" (London, 1850), "History of the British Conquests in India" (2 vols., 1852), and "The Indian Archipelago" (2 vols., 1853). His wife has published "Audubon, the Naturalist in the New World" (1856), "English Women and the Age" (1860), and "Masaniello of Naples" (1865).

SAINT JOHN OF JERUSALEM, Knights Hospitallers of the Order of (also called knights of Rhodes and knights of Malta), a religious and military order which originated in the middle of the 11th century. In 1048 permission was granted to a few merchants from Amalfi to build a chapel for Latin pilgrims near the holy sepulchre, and to connect with it two hospitals or hosteleries, one for men and the other for women. The chapel, common at first to both sexes, was called St. Mary of the Latins; a second chapel attached soon afterward to the female hospital was called after St. Mary Magdalen. The hospital for men bore the name of St. John the Almoner, a native of Cyprus and patriarch of Alexandria (died about 616), who had sent money and provisions to Jerusalem in 614, after it had been sacked by Chosroes II. The service in the hospitals was performed by a confraternity of pilgrims of both sexes, under the direction of Gerard (called also Bienheureux Pierre Gérard and Gerard the Blessed), the whole establishment as well as the confraternity being called after St. John the Almoner. They displayed such heroic charity on the occasion of the capture of Jerusalem by the crusaders, July 15, 1099, that several noble knights, among them Raymond du Puy or del Puich, joined them as hospitallers. Godfrey de Bouillon bestowed on them the lordship of Montboire in Brabant, and other princes imitated his example. When peace was restored to the city, Gerard and his associates bound themselves to labor for ever in the hospitals

"as the servants of the poor and of Christ," and the members of both sexes assumed for their distinctive habit the black robe of the Augustinians, with a white linen cross of eight points on the left breast. The order was approved by Pope Paschal II., Feb. 15, 1113, under the appellation of "Brothers Hospitalers of St. John in Jerusalem." Extensive additions were made to the original establishments, and a magnificent new church was erected to St. John the Baptist on the traditional site of his parents' abode. Gerard then took the title of guardian and provost of the order, and built for the accommodation of pilgrims hospitals in the chief maritime towns of western Europe, which afterward became commanderies of the order. Gerard died in 1118, and was succeeded by Raymond du Puy, who, to protect the Christians of Jerusalem and the bands of pilgrims against the Moslems, armed himself and his former brother knights among the hospitallers. This met with general approbation in Palestine and in Europe, and attracted to the order the élite of the young nobility. To their original and common monastic vows the hospitallers now added a solemn vow of bearing arms in defence of Christendom, and of defending all Christians from insult and wrong. Raymond du Puy divided the order into knights, priests, and brothers servants. There also grew up a numerous intermediate class of sergeants (old Fr. *serfjents*, serving men) or half knights, who rendered important services in the field and the infirmary, and were in course of time assigned separate commanderies. As the new church of St. John the Baptist quite eclipsed the former modest chapel, the order under its new organization was called after St. John the Baptist. Raymond exchanged the title of guardian for that of master; the title of grand master was first assumed by Hugues de Revel in 1267. Raymond du Puy drew up constitutions based on the Augustinian rule, which together with the other changes in the order were approved by Pope Calixtus II. in 1120. The great influx of members caused the order to be divided according to nationalities or "languages," there being at first seven languages, those of Provence, Auvergne, France, Italy, Aragon, Germany, and England, to which were added subsequently the languages of Castile and Portugal. Du Puy during his period of office delivered from the Moslems the principality of Antioch, raised the siege of Jaffa, and aided powerfully in the fall of Tyre, besides driving the enemy from Cœle-Syria and Phœnicia, and contributing to the fall of Ascalon in 1153. The fame of these services brought them numerous valuable gifts, which soon proved detrimental to their efficiency. In 1168 the grand master Gûlbert d'Assalit and a majority of the knights were bribed by Amaury, king of Jerusalem, to engage in an expedition against Egypt, in violation of a solemn treaty. In 1187 the order was nearly annihilated by Saladin in the battle

of Tiberias. After the fall of Jerusalem it was established at the castle of Margat (the present Markab), the female branch of the order retiring to Europe. The knights were involved in disputes and hostilities with the templars, to the damage of both orders; but they continued to serve valiantly against the infidels. At the battle of Gaza, in 1244, both orders were nearly exterminated by the Kharemsians. When Acre fell into the hands of the Saracens (1291), the hospitallers removed to Limisso in Cyprus, where they were recruited by drafts on the European commanderies. In this insular residence originated their naval character, as their vessels conveyed pilgrims to the Holy Land. This led to sea fights, in which the brethren became as distinguished as they had been on land. They seized Rhodes in 1309, fortified it, and held it for more than two centuries against the utmost power of the Turks, and were hence called knights of Rhodes. Of the two memorable sieges they sustained there, the first, in 1480, under the grand master D'Aubusson, proved disastrous to the besiegers, and the second, under L'Isle-Adam, in 1522, after a heroic defence of six months, ended in the defeat of the knights and their evacuating the island. After taking refuge successively in Candia, Messina, and the mainland of Italy, they were in 1530 put in possession of the islands of Gozo and Malta and the city of Tripoli by the emperor Charles V. Malta, which the knights made one of the strongest places in the world, became thenceforward the bulwark of Christendom, and gave its name to the order. The Turks made a fruitless attack on the island in 1551, and renewed it in 1565, with an armament calculated to command success; but the grand master, Jean Parisot de la Valette, after four months of incredible endurance, forced the besiegers to depart. This defence raised the fame of the order to its height. They held Malta till June, 1798, when it was taken by Bonaparte, the grand master Hompesch having abdicated and been sent to Trieste. (See HOMPESCH.) Since this event the order has existed only in name. It was protected for a time by the emperor Paul I. of Russia, whose reported conversion to the Roman Catholic church caused him to be chosen grand master. The seat of the order was removed to Catana in 1801, to Ferrara in 1826, and to Rome in 1834. A fruitless attempt to restore it was made in 1850. Since 1805 the order has been administered by a lieutenant and a college residing in Rome.

SAINT JOHN'S, a N. E. county of Florida, lying between the St. John's river and the Atlantic, and drained by the St. John's and its affluents; area, 900 sq. m.; pop. in 1870, 2,618, of whom 681 were colored. The surface is flat and much of it marshy. There are some live oaks. The chief productions in 1870 were 7,630 bushels of Indian corn, 15,235 of sweet potatoes, 1,000 lbs. of rice, 67 hog-heads of sugar, and 3,457 gallons of molasses.

There were 5,664 cattle and 1,728 swine. Capital, St. Augustine.

SAINT JOHN'S, a S. W. county of Quebec, Canada, bordering on New York; area, 175 sq. m.; pop. in 1871, 12,122, of whom 9,415 were of French, 1,285 of English, and 963 of Irish origin. It is bounded E. by the Richelieu river, and is traversed by the Rouse's Point division of the Grand Trunk railway. Capital, St. Johns.

SAINT JOHN'S, the capital and commercial metropolis of Newfoundland, the easternmost town of North America, situated in the S. E. part of the island, on the N. side of a harbor of the same name on the E. coast of the peninsula of Avalon, 65 m. N. of Cape Race and 18 m. S. of Cape St. Francis, 550 m. E. N. E. of Halifax, Nova Scotia; lat. 47° 34' N., lon. 52° 42' W.; pop. in 1874, 23,890. The site ascends gradually from the harbor, the highest point being 225 ft. above the sea. Opposite the town, on the S. side of the harbor, the hills rise abruptly from the water's edge 700 ft.; but a small space at their base has been made available for building, and here have been erected warehouses and steam factories for the manufacture of seal and cod oil. The country around St. John's is picturesque and generally well cultivated. The town consists of three streets nearly parallel with the harbor, and others crossing these at right angles. A fourth main street, on which are situated the government house, colonial building, skating rinks, &c., is being rapidly built up. The streets are well drained and macadamized, and are lighted with gas. A supply of water was introduced in 1861, at a cost of \$360,000, from a large lake 5 m. distant, and elevated 150 ft. above the highest part of the town. The principal thoroughfare stretches along the water's edge about 1½ m., and is well built up with brick and stone. From it the wharves project into the harbor. On the other streets the houses are mostly of wood. The government house (residence of the governor) is a plain structure, erected at a cost of \$240,000. The colonial lunatic asylum is beautifully situated in wooded grounds about 3 m. out of town. Other public edifices are the colonial building (containing the public offices and legislative halls), custom house, colonial penitentiary, post office, court house, general hospital, smallpox hospital, market house, and poor-house (in the suburbs). The Roman Catholic cathedral is one of the finest church edifices in North America; it occupies the highest ground in town, and with the adjacent buildings cost \$800,000. The church of England cathedral, not yet completed, is a fine specimen of architecture, and is handsomely decorated within. The wharves and stages for drying fish, which line the shore, are a peculiarity of the town. The harbor is landlocked and somewhat crescent-shaped; it is deep, and has good anchorage. The entrance is through the "Narrows," a gorge between two steep and rugged cliffs,

220 yards wide and 660 yards long, with 12 fathoms of water in mid-channel. The cliffs were formerly fortified by several batteries, but these have become dismantled since the withdrawal of the British garrison. On the S. cliff is a lighthouse, with a light 114 ft. above the sea. There are also two lights in the town serving as a guide to the harbor. The harbor is $1\frac{1}{2}$ m. long, and from 500 yards to a little more than $\frac{1}{2}$ m. wide. On the S. side is a dry dock capable of raising vessels of 600 tons, and a marine railway for a smaller class of vessels. The N. and S. sides are connected by a causeway and bridge. It is open the entire year. There is regular steam communication with Europe and America, and steamers and sailing packets run to different points in the island. The trade consists chiefly in supplying the fishermen of Newfoundland with clothing, provisions, and tackle, and in exporting the products of the fisheries, chiefly codfish, seal skins, and cod and seal oil, which are mostly taken to Great Britain, Spain, Portugal, and Brazil. Another important industry is the fitting out of vessels for the seal fishery. The value of imports during 1874 was about \$6,000,000; of exports, about \$5,000,000. The number of entrances was 898, tonnage 220,916; clearances, 724, tonnage 195,392. About 80 per cent. of the imports and 75 per cent. of the exports of the island pass through this port. The number of vessels engaged in the seal fishery from St. John's in 1874 was 24 (13 steamers and 11 sailing vessels), with an aggregate tonnage of 4,801 and crews numbering 2,841 men; number of seals taken, 150,000. The number of vessels owned at the port in 1874 was 1,319, with an aggregate tonnage of 67,185, of which 18, tonnage 5,447, were steamers, and 1,301, tonnage 67,185, sailing vessels. The latter are scattered throughout the island and owned or sailed by dealers or mercantile houses in St. John's. The manufactures of St. John's are of secondary importance and of limited extent. The principal establishments are three foundries, three breweries, a distillery, two tanneries, a rope factory, a block factory, several manufactories of boots and shoes, several of carriages, one of cabinet ware, one of nets, four biscuit bakeries, and several oil refineries. There are two banks, a savings bank, and a marine insurance company. There is no municipal corporation, the town being governed directly by the colonial legislature. The only local taxation is a rate levied on houses under acts of the legislature for water and sewerage. The town is well policed, and there are several volunteer fire companies. The principal charitable institutions not already mentioned are a Roman Catholic orphanage for girls, an asylum for widows and orphan girls, and another for boys, in connection with the church of England. The educational institutions include St. Bonaventure college (Roman Catholic), a church of England, a Wesleyan, and a general Protestant academy, a Presby-

terian school, an industrial school and an orphan asylum school under the control of the benevolent Irish society, a number of common schools under the control of the government boards or of the colonial and continental church and school society, and several private schools. There are two public libraries, having together 5,000 or 6,000 volumes. The principal one is in connection with the St. John's Athenæum (which is now erecting a large building for lectures, concerts, and other purposes), and the other with the Catholic institute. Three tri-weekly, four semi-weekly, and three weekly newspapers are published. There are 11 churches, including the cathedrals, viz.: 3 church of England, 1 Congregational, 2 Presbyterian (one in connection with the established and one with the Free church of Scotland), 3 Roman Catholic, and 2 Wesleyan Methodist. The church of England has here a theological institute for the training of young men for mission work in the colony.—St. John's appears to have been resorted to by fishermen (chiefly French and Spanish) in the early part of the 16th century. The harbor was entered by Sir Humphrey Gilbert in 1583, who took formal possession of the island in the name of Queen Elizabeth. The town was several times the scene of conflict between the French and English until the island came finally into the possession of the latter by the treaty of Utrecht in 1713. It has been visited by several conflagrations, the most destructive in 1846.

SAINT JOHNS (Fr. *St. Jean*), a town, port of entry, and the capital of St. Johns co., Quebec, Canada, 20 m. S. E. of Montreal; pop. in 1871, 3,022. It is situated on the W. bank of the Richelieu river, here spanned by a fine bridge, and by means of canals affording a navigable connection between Lake Champlain and the river St. Lawrence. Divisions of the Grand Trunk and Central Vermont railways intersect here with the Southeastern and the Stanstead, Shefford, and Chambly railways. There is a large trade in lumber, grain, and other produce. The town contains saw, grist, and planing mills, brick yards, two breweries, and manufactories of iron castings, leather, earthenware, &c. It is the seat of a lunatic asylum, and has a bank, a branch bank, about 40 stores, commodious barracks, two weekly newspapers, and four or five churches. The value of imports for the year ending June 30, 1874, was \$717,174; of exports, \$4,873,812.

SAINT JOHN THE BAPTIST, a S. E. parish of Louisiana, intersected by the Mississippi river, bordering N. W. on Lake Maurepas, N. E. on Lake Pontchartrain, and S. W. on Lake Des Allemands; area, about 250 sq. m.; pop. in 1870, 6,762, of whom 4,044 were colored. The surface is level and the soil fertile. The chief productions in 1870 were 106,884 bushels of Indian corn, 1,360 tons of hay, 4,962 hogsheads of sugar, 346,100 gallons of molasses, and 632,670 lbs. of rice. There were 337 horses, 1,570 mules and asses, 1,157 cattle, 294

sheep, and 381 swine. The parish has railroad communication with New Orleans. Capital, Edgard.

SAINT JOHNSBURY, a town and the county seat of Caledonia co., Vermont, on the Passumpsic river, and on the Portland and Ogdensburg and the Connecticut and Passumpsic Rivers railroads, 38 m. E. N. E. of Montpelier; pop. in 1850, 2,758; in 1860, 3,469; in 1870, 4,665. It contains three villages, St. Johnsbury, St. Johnsbury Centre, and St. Johnsbury East. The first is much the largest, and has many neat residences and good public buildings. The court house is a fine structure, and in front is a soldiers' monument. The Athenæum, also a fine building, contains a public reading room with a library of more than 10,000 volumes and a gallery of choice paintings and works of art. The principal educational institution besides the free public schools is the St. Johnsbury academy. The town has two national banks, a savings bank, two weekly newspapers, and 11 churches. There are iron foundries and manufactories of agricultural implements, &c.; but the chief industrial feature is the extensive manufactory of the "Fairbanks standard scales," in St. Johnsbury village. The works occupy 15 acres and employ from 500 to 600 men; annual value of products, more than \$2,000,000.

SAINT JOHN'S RIVER. See FLORIDA.

SAINT JOSEPH. I. A N. county of Indiana, bordering on Michigan, drained by the St. Joseph and Kankakee rivers, and traversed by several railroads; area, 470 sq. m.; pop. in 1870, 25,322. The surface is nearly level, and is divided about equally into oak openings, forests, and prairie. The chief productions in 1870 were 503,757 bushels of wheat, 233,045 of Indian corn, 76,846 of oats, 19,910 tons of hay, 55,506 lbs. of wool, 352,577 of butter, and 61,024 of maple sugar. There were 5,700 horses, 5,537 milch cows, 6,197 other cattle, 16,639 sheep, and 13,560 swine; 6 manufactories of agricultural implements, 7 of brick, 15 of carriages and wagons, 3 of cutlery and edge tools, 15 of furniture, 3 of iron castings, 5 of sash, doors, and blinds, 1 of sewing machine fixtures, 3 of woollen goods, 28 saw mills, 2 planing mills, and 9 flour mills. Capital, South Bend. **II.** A S. W. county of Michigan, bordering on Indiana and drained by the St. Joseph, Portage, Prairie, Pigeon, and Fawn rivers; area, about 550 sq. m.; pop. in 1870, 26,275. The surface is rolling and the soil is very fertile. It is intersected by the Michigan Southern, Michigan Central, and other railroads. Large quantities of peppermint are raised in this county. The chief productions in 1870 were 756,428 bushels of wheat, 654,712 of Indian corn, 91,184 of oats, 400,201 of potatoes, 31,227 tons of hay, 203,223 lbs. of wool, 483,104 of butter, and 14,780 gallons of sorghum molasses. There were 7,362 horses, 5,792 milch cows, 6,203 other cattle, 46,128 sheep, and 21,020 swine; 10 manufactories of agricul-

tural implements, 19 of carriages and wagons, 3 of furniture, 3 of iron castings, 10 of leather, 7 breweries, 20 saw mills, 6 flour mills, and 4 ship yards. Capital, Centreville.

SAINT JOSEPH, a river of Michigan and Indiana, rises in Hillsdale co., Mich., and after making a circuit into northern Indiana returns into Michigan, and falls into Lake Michigan, at the village of St. Joseph, after a course of 250 m. Its general direction is nearly W., but its course is serpentine. It is navigable for small steamboats to Constantine, 120 m. from its mouth, where is a good harbor.

SAINT JOSEPH, a city and the county seat of Buchanan co., Missouri, on the great E. bend of the Missouri river, 260 m. W. by N. of St. Louis, and 390 m. W. S. W. of Chicago; pop. in 1860, 8,932; in 1870, 19,565, of whom 1,512 were colored; in 1875, about 25,000. It has a court house erected in 1875 at a cost of \$200,000, a handsome city hall and market house, a large convent, 17 church edifices, and several large hotels. The great iron bridge across the river at this point, for railway and ordinary travel, was built in 1873 by the city, at a cost of \$710,000. One of the state lunatic asylums is situated here; it was erected in 1874 at a cost of \$220,000, and has accommodations for 200 patients. The "Agricultural and Mechanical Exposition of St. Joseph" has extensive grounds and buildings, and holds an annual fair in September. Railway facilities have given St. Joseph its business importance. Five lines of railroad centre here, affording three separate and direct routes to St. Louis, three to Chicago and the east, three to Kansas City, one to Council Bluffs and Omaha, and one to Denver, viz.: the Kansas City, St. Joseph, and Council Bluffs; Hannibal and St. Joseph; St. Louis, Kansas City, and Northern; St. Joseph and Denver City; and St. Joseph and Topeka. The wholesale trade is the largest after San Francisco W. of St. Louis or Chicago, commanding the most productive agricultural portion of the far west; in 1874 it amounted to over \$18,000,000. The city has seven banking institutions, two being savings banks. It is the largest manufacturing point after San Francisco W. of the Mississippi, having five flouring mills, one large grain elevator, a starch factory with a capacity of 1,200 bushels of corn a day, two furniture factories, a woollen mill, nine saddlery and harness establishments, two foundries and machine shops, two boot and shoe factories, four pork-packing establishments, which packed 108,000 hogs in 1874, twelve wagon factories, a glue factory, a distillery, and a tannery. The city has a graded public school system, with 15 schools, including a high school, 52 teachers, and 3,362 pupils. There are also several academies and private schools, including St. Joseph college and several other Roman Catholic institutions. Three daily and four weekly newspapers are published, and there are two public libraries. The number of churches is

17, viz.: 3 Baptist, 1 Christian, 1 Episcopal, 1 Evangelical, 1 Jewish, 5 Methodist, 2 Presbyterian, and 3 Roman Catholic, including the cathedral.—St. Joseph was laid out in 1846, and incorporated as a city in 1857.

SAINT JOSEPH'S RIVER. See SAINT JOSEPH.

SAINT-JUST, Antoine Louis Léon de, a French revolutionist, born at Decize, near Nevers, in 1767 or 1768, guillotined in Paris, July 28, 1794. He early imbibed a very extravagant admiration of the ancient republics, and published several poems, and in 1791 a work entitled *Esprit de la révolution et de la constitution de France*. Through the influence of Robespierre he was in 1792 elected to the convention. He took the foremost rank among the violent spirits in that body, voted for the immediate execution of Louis XVI., advocated the concentration of all power in the convention, including the supervision of military operations, and urged the reign of terror as the only means of safety for France, declaring that "those who make half-way revolutions only dig their own graves." After the fall of the Girondists he became a member of the committee of public safety, and as commissioner to the army of the Rhine he established the guillotine in Alsace. In February, 1794, he was named president of the convention, and in March made the report against Danton and his partisans which insured their death. With Robespierre and Couthon he formed the triumvirate of the reign of terror. On the 9th Thermidor he tried by speaking to resist the public wrath, but the next day he was executed. His *Œuvres politiques* have been collected (1833-'4), and his life has been written by Fleury (2 vols., 1852) and Hamel (1859).

SAINT-LAMBERT, Jean François de, a French poet, born in Nancy, Dec. 26, 1716, died in Paris, Feb. 9, 1803. He was connected with the court of King Stanislas, where he met Voltaire and his mistress, the marchioness du Châtelet, who died in giving birth to a child by him. Voltaire continued to befriend him nevertheless. His next and lifelong mistress was Mme. d'Houdetot, with whom Rousseau was also in love. After serving in the army in 1756-'7, he was one of the leaders of literary society in Paris. He published miscellaneous works, of which his minor poems are the best. His elaborate poem *Les saisons* (1769; revised and enlarged ed., 1771) gained his admission to the academy.

SAINT LANDRY, a S. W. parish of Louisiana, bounded E. by the Atchafalaya river, and W. in part by Bayou Nezpique, and drained by numerous bayous; area, about 2,200 sq. m.; pop. in 1870, 25,553, of whom 11,694 were colored. The surface is high and undulating, and the soil fertile. The chief productions in 1870 were 368,897 bushels of Indian corn, 58,811 of sweet potatoes, 14,305 bales of cotton, 1,350 lbs. of tobacco, 33,375 of rice, 5,026 of wool, 1,988 hogsheds of sugar, and 118,110 gallons of molasses. There were 5,843 horses,

2,052 mules and asses, 8,455 milch cows, 3,049 working oxen, 15,074 other cattle, 9,398 sheep, and 17,188 swine. There were 17 molasses and sugar establishments. Capital, Opelousas.

SAINT LAWRENCE, a river and gulf of North America. The river proper begins at Kingston, at the foot of Lake Ontario, and flows N. E., first between New York and Ontario, Canada, and then through the province of Quebec, about 750 m., to the gulf. It insensibly expands into the gulf, but is usually considered as terminating between Cape Chatte on the south and Pointe des Monts on the north, about lat. 49° 15' N., lon. 67° W. At its issue from Lake Ontario it is 2½ m. wide, and in the narrowest parts its width is seldom less than 2 m. Below the city of Quebec it gradually expands, and at its mouth is upward of 30 m. wide. At Cape Gaspé the gulf is nearly 100 m. wide. The principal expansions above Quebec are Lake St. Peter, 80 m. long and 10 m. wide, just above Three Rivers; that containing the island of Montreal, Isle Jésus, and Isle Perrot; Lake St. Francis, a little further up; and the Lake of the Thousand Islands, near its issue from Lake Ontario, containing the celebrated Thousand islands. The principal island below Quebec is the isle of Orleans. The influence of the tide is felt as high up as Lake St. Peter. Its principal tributaries on the N. side are the Ottawa, the St. Maurice, the Saguenay, and the Betsiamite or Bersimis; those on the S. side, which are smaller and of less importance, are the Oswegatchie, Grass, Raquette, St. Regis, Sorel (also called the Richelieu, Chambly, or St. Johns), St. Francis, and Chaudière rivers. The St. Lawrence drains a territory of over 400,000 sq. m., and its basin, reckoned from its extreme source, was computed by Darby, before the discovery of the great African lakes, to contain "more than half of all the fresh water on this planet." Early French geographers, treating the great lakes as expansions of the stream, made the river Nipigon, on the N. side of Lake Superior, the head stream of the St. Lawrence. Others have considered as such the St. Louis river, emptying into the S. W. extremity of Lake Superior. In either case the total length would be upward of 2,000 m. Besides Lakes Ontario, Erie, St. Clair, Huron, Michigan, and Superior, there is a number of lakes N. and W. of Lake Superior, which together would about equal Lake Ontario. These all pour their waters into the ocean through the St. Lawrence. Regarding the chain as one stream, between Lakes Superior and Huron it is known as the St. Mary's river; between Huron and St. Clair as the St. Clair river; between St. Clair and Erie as the Detroit river; and between Erie and Ontario as the Niagara river. The St. Lawrence is navigable by sea-going vessels to Montreal. Above that city its navigation is impeded by rapids, of which the Cedar and Lachine are the most considerable. The inclination of these rapids is so regular, that

steamboats drawing 7 ft. of water can descend the river safely; and for the purpose of obviating the difficulty of ascent (Lake Ontario being 231 ft. above the ocean level according to former measurements, and according to J. T. Gardner's recent calculations several feet higher), seven different canals have been constructed, of an aggregate length of 41 m., which will admit the passage of vessels of 1,000 tons. A canal has also been constructed from Lake Ontario to Lake Erie, called the Welland canal, 28 m. in length, and having capacity to pass a vessel of 500 tons burden. There is also a ship canal of large size around the falls of St. Mary, between Lake Huron and Lake Superior. A vessel of 500 tons may load from the mouth of the St. Louis river at Duluth, Minn., or from Chicago, and, without breaking bulk, pass down the St. Lawrence to any port in the world. An enlargement of the St. Lawrence and Welland canals is now (1875) in progress. When this is completed, the locks will each have 270 ft. of chamber, with a width of 45 ft., and a depth of 14 ft. over the mitre sills. The enlargement was at first intended to give only 12 ft. of water, and to obtain this depth the official estimate of cost was \$10,000,000. From one third to one fourth of the vessels employed on the upper lakes are too large to pass through the existing Welland canal into Lake Ontario; the enlarged canals, which may be ready for the season of 1880, will be able to pass the largest vessels used on those waters. Enormous as is the water supply of the St. Lawrence canals, it is subject to considerable periodic changes of level; and the proposed 14 ft. of water in them is estimated from the lowest levels that have been reached in 55 years, during which the difference between the highest and the lowest levels has been $5\frac{1}{2}$ ft. in Lake Ontario; and to secure the required depth it is intended to sink the locks 15 ft. below the low-water mark. The annual rise is from 10 to 20 in.; but besides this there is an irregularly recurring change of level, extending over a series of years, which cannot be calculated. The number of days during which the canals have been open during the past 24 years has varied, in the case of the Lachine canal, from 197 to 233, the average probably being 220; of the Beauharnois, from 209 to 229, with an average a little higher than the Lachine. In 1874, 1,000,573 tons of shipping passed through the St. Lawrence canals, and 1,389,173 tons through the Welland.—The gulf of St. Lawrence, which receives the waters of this mighty river, is bounded N. by Labrador, E. by the islands of Newfoundland and Cape Breton, S. by Nova Scotia, and W. by New Brunswick and Quebec. It has an estimated area of 80,000 sq. m. It has three channels of communication with the ocean, viz., between Newfoundland and Cape Breton, by the strait of Belle Isle on the north, and through the gut of Canso on the south. It has numerous islands, among which

the largest are Anticosti, Prince Edward, and the Magdalen group. Its principal bays are those of Chaleurs, between New Brunswick and Quebec; Miramichi, in New Brunswick; St. George, in Nova Scotia; and St. George's, in Newfoundland.

SAINT LAWRENCE, a N. county of New York, bordered N. W. by the St. Lawrence river, drained by the Indian, Oswegatchie, Grass, Raquette, St. Regis, and Deer rivers and their affluents, and traversed by several railroads; area, 2,900 sq. m., being the largest county in the state; pop. in 1870, 84,826. It has three lakes of considerable size, Long, Black, and Cranberry, besides several smaller ones. The southern portion of the county is as yet but thinly settled, and is heavily timbered. Along the St. Lawrence the surface is generally level and very productive. There are mines of lead and specular iron ore. The chief productions in 1870 were 569,701 bushels of wheat, 35,295 of rye, 174,840 of Indian corn, 1,077,345 of oats, 196,421 of barley, 57,078 of buckwheat, 1,217,894 of potatoes, 269,250 tons of hay, 281,962 lbs. of wool, 8,419,695 of butter, 1,710,082 of cheese, 157,275 of hops, 104,266 of flax, 1,063,592 of maple sugar, and 23,283 of honey. There were 24,126 horses, 87,293 milch cows, 1,612 working oxen, 31,693 other cattle, 62,632 sheep, and 16,981 swine; 4 manufacturing of agricultural implements, 8 of pot and pearl ashes, 10 of brick, 46 of carriages and wagons, 20 of cheese, 8 of iron castings, 26 of tanned and 20 of curried leather, 9 of machinery, 30 of saddlery and harness, 9 of starch, 19 of tin, copper, and sheet-iron ware, 11 of wooden ware, 8 of woollen goods, 7 wool-carding and cloth-dressing establishments, 25 flour mills, 97 saw mills, and 3 planing mills. Capital, Canton.

SAINT LEONARDS, Edward Burtenshaw Sugden, baron, an English jurist, born in London in February, 1781, died there, Jan. 29, 1875. He studied law at Lincoln's Inn, was admitted to practice in 1807, gave up his chamber practice, and confined himself to the chancery bar in 1817, became king's counsel and bencher of Lincoln's Inn in 1822, and was elected to parliament for Weymouth in 1828, and for Ripon in 1837. He was knighted in 1829, and was solicitor general in 1829-'31, lord chancellor of Ireland in 1835 and again in 1841-'6, and lord chancellor of England for a few months in 1852, when he was raised to the peerage. He published "A Concise and Practical Treatise of the Law of Vendors and Purchasers" (London, 1805; 14th ed., 1862; 7th American ed., New York, 1851); "A Practical Treatise on Powers" (1808; 8th ed., 1861); "Letters to a Man of Property, on Sales, Purchases, Mortgages," &c. (1809; 5th ed., 1829); a "Treatise on the Law of Property, as administered in the House of Lords" (1849); and "A Handbook on Property Law" (1858; 8th ed., 1869).

SAINT-LÔ, a town of Normandy, France, capital of the department of La Manche, on the

Vire, 158 m. W. by N. of Paris; pop. in 1872, 9,287. The beautiful Gothic church of Notre Dame was formerly a cathedral, and the church of Sainte Croix, said to have been built by Charlemagne, was generally regarded as the completest monument of Saxon architecture; it was entirely rebuilt in 1860, and the old church of St. Thomas de Cantorbéry has been converted into a town hall. Fine cloths, drugget, ribbons, linen, lace, and leather are made.

SAINT LOUIS. I. A N. E. county of Minnesota, bounded N. E. by the chain of small lakes which separate that state from British America, S. E. by Lake Superior, and drained by St. Louis, Vermilion, and other rivers; area, 6,500 sq. m.; pop. in 1870, 4,561. The county is interspersed with lakes, the largest of which are Vermilion and Pelican. It contains much timber. The value of manufactures, according to the census of 1870, was \$262,000, the chief establishments being three saw mills. The Northern Pacific and Lake Superior and Mississippi railroads terminate at the capital, Duluth. II. An E. county of Missouri, occupying the tongue of land formed by the junction of the Mississippi and Missouri rivers, and drained by the Maramec; area, 550 sq. m.; pop. in 1870, 351,189, of whom 26,387 were colored. The surface is varied and the soil very fertile. There are extensive mines of coal and quarries of marble, and the W. part extends into the great iron region of the state. The chief productions in 1870 were 454,026 bushels of wheat, 1,023,978 of Indian corn, 280,783 of oats, 24,062 of barley, 377,316 of potatoes, 30,333 tons of hay, 14,570 lbs. of tobacco, 15,537 of wool, 288,615 of butter, 39,815 of cheese, and 46,836 gallons of wine. There were on farms 7,037 horses, 2,229 mules and asses, 8,216 milch cows, 5,136 other cattle, 6,692 sheep, and 27,198 swine. Capital, St. Louis.

SAINT LOUIS, the chief city of Missouri, county seat of St. Louis co., and the commercial metropolis of the central Mississippi valley, on the right bank of the Mississippi river, 20 m. below the entrance of the Missouri, about 175 m. above the mouth of the Ohio, 1,170 m. above New Orleans, and 125 m. E. of Jefferson City; lat. 38° 37' 28" N., lon. 90° 15' 16" W.; pop. in 1810, 1,600; in 1820, 4,598; in 1830, 5,852; in 1840, 16,469; in 1850, 77,860; in 1860, 160,773; in 1870 (when it was the fourth city in the United States in population), 310,864, of whom 22,088 were colored; in 1875, estimated by local authorities as high as 490,000. Of the population in 1870, 161,796 were males and 149,068 females, 198,615 natives and 112,249 foreigners, of whom 2,652 were born in Bohemia, 2,008 in British America, 2,788 in France, 59,040 in Germany, 5,367 in England, 32,239 in Ireland, 1,202 in Scotland, and 2,902 in Switzerland. There were 59,431 families, with an average of 5.23 persons to each, and 39,675 dwellings, with an average of 7.84 to each. Of the 108,691 persons 10 years old and over returned

as engaged in all occupations, 810 were employed in agriculture, 41,418 in professional and personal services, 28,219 in trade and transportation, and 38,244 in manufactures and mining.—The city is many feet above high water. It is built on three terraces, the first rising gently from the river for about 1 m. to 17th street, where the elevation is 150 ft. above the stream. The ground then gently declines, rises in a second terrace to 25th street, again falls, and subsequently rises in a third terrace to a height of 200 ft. at Côte Brillante or Wilson's hill, 4 m. W. of the river. The surface here spreads out into a wide and beautiful plain. The corporate limits extend 11½ m. along the river, and in extreme width 3 m. back from it; area, 13,216 acres or 20½ sq. m. The densely built portion is comprised in a district of about 6 m. along the river and 2 m. in width. The city is for the most part regularly laid out, the streets near the river running parallel with its curve, while further back they are generally at right angles with those running W. from the river bank. Grand avenue, in part 120 ft. wide, extends through the city from N. to S., and in the centre is about 3 m. from the river. Washington avenue, one of the widest and finest in St. Louis, runs back from the river; at its foot is the terminus of the great bridge. Front street, 100 ft. wide, extends along the levee, and is built up with massive stone warehouses. The wholesale trade is chiefly on Main and 2d streets, but is extending into Washington avenue and 5th street. The fashionable promenade is 4th street, containing the leading retail stores. There are 14 street railroad companies, running to various parts of the city, and one over the bridge to East St. Louis. The city is remarkably well built, largely of brick or stone. The principal public buildings are the city hall, the court house, erected at an expense of \$1,200,000, the jail, the county insane asylum, the Masonic temple, the polytechnic building, the custom house and post office, costing \$350,000, the United States arsenal (a large and imposing structure in the S. E. part of the city, surrounded with fine grounds), the merchants' exchange, the mercantile library hall, the city hospital, the marine hospital, the high school building, Washington university, St. Louis university, several hotels (the chief of which are the Southern, Planters', Barnum's, Lindell, and Laclede), the Roman Catholic cathedral (136 ft. long and 84 ft. wide, with a front of polished free stone), St. George's (Episcopal) church, the church of the Messiah (Unitarian), the first and second Presbyterian churches, the Baptist church at 6th and Locust streets, the Jewish temple at 16th and Pine streets, the Union Methodist church at 11th and Locust streets, the Lutheran church at 8th and Walnut streets, the Congregational church at 10th and Locust streets, and the Presbyterian churches at 11th and Pine and 16th and Walnut streets. A new custom house and post office

and a new exchange are in course of erection (1875). The public squares and parks embrace in the aggregate about 2,000 acres. Missouri park, Hyde park, Gravois park, Jackson place, Carr place, St. Louis place, and Washington square, with from $1\frac{1}{2}$ to 12 acres each, are

acres), in the N. part of the city, about a mile from the river. On the opposite bank of the Mississippi is East St. Louis, a city of St. Clair co., Ill., incorporated in 1865, and containing in 1875 upward of 10,000 inhabitants. It has a river front of 2 m., numerous manufacto-



New Court House.

within the settled portion of the city. Lafayette park, in the S. portion, contains about 30 acres; it is handsomely laid out, and surrounded by elegant dwellings. The Northern park, 180 acres, on the bluffs in the N. portion, is noted for its fine trees. Lindell park, 60 acres, on the line of Forest Park boulevard, is tastefully laid out, and filled with native forest trees. Forest park, 1,350 acres, still mostly covered with primitive trees, W. of the centre of the city and about 4 m. from the river, is bounded by wide boulevards. Lindell boulevard (194 ft. wide) and Forest Park boulevard (150 ft. wide), each about 2 m. long, extend from it toward the heart of the city. The Des Pères river meanders through this park. Other public grounds are Carondelet, Laclede, and Benton parks, Exchange square, and Clinton and Marion places. Tower Grove park, adjoining Shaw's botanical garden, is in the S. W. part of the city, and contains 277 acres. The garden (109 acres) is owned by Henry Shaw, who has opened it to the public, and intends it as a gift to the city. The fair grounds of the St. Louis agricultural and mechanical association, 85 acres, N. W. of the centre of the city, are handsomely laid out and ornamented, and contain extensive buildings; the amphitheatre will seat 25,000 persons. The handsomest cemeteries are Bellefontaine (350 acres) and Calvary (262

acres), in the N. part of the city, about a mile from the river. On the opposite bank of the Mississippi is East St. Louis, a city of St. Clair co., Ill., incorporated in 1865, and containing in 1875 upward of 10,000 inhabitants. It has a river front of 2 m., numerous manufacto-

ries, several railroad shops, an elevator, and the extensive national stock yard. It is connected with St. Louis by ferry and by the great bridge, before the completion of which it was the terminus of all the railroads extending east. The bridge is of steel, and rests on four piers. (See BRIDGE, vol. iii., p. 276.) It passes over a viaduct of five arches (27 ft. span each) into Washington avenue. The lower roadway runs into a tunnel, 15 ft. wide, 17 ft. high, and 4,800 ft. long, which passes under a large portion of the city, terminating near 11th street, where a great central railroad depot is in

course of construction (1875).—St. Louis communicates by river and rail with a vast extent of fertile country. Sixteen lines of railroad centre here, viz.: the Ohio and Mississippi; Chicago, Alton, and St. Louis; Indianapolis and St. Louis; Atlantic and Pacific; Missouri Pacific; St. Louis, Kansas City, and Northern; St. Louis and Iron Mountain; St. Louis, Vandalia, Terre Haute, and Indianapolis; Rockford, Rock Island, and St. Louis; Belleville and Southern Illinois; Toledo, Wabash, and Western; St. Louis and Southeastern; Illinois and St. Louis; Missouri, Kansas, and Texas; Illinois Central; and Cairo and St. Louis. The arrivals of barges and canal boats in 1874 numbered 951; of steamers, 2,332, viz.: from the upper Mississippi, 1,063; lower Mississippi, 752; Illinois river, 269; Missouri river, 104; Ohio river, 113; elsewhere, 31.

RECEIPTS OF FREIGHT FOR FOUR YEARS.

YEAR.	By rail.	By river.	Total.
1871....	2,298,321 tons.	884,401 tons.	3,182,722 tons.
1872....	2,888,364 "	863,819 "	3,752,183 "
1873....	3,245,178 "	801,055 "	4,046,233 "
1874....	3,165,093 "	732,765 "	3,897,858 "

SHIPMENTS OF FREIGHT FOR FOUR YEARS.

YEAR.	By rail.	By river.	Total.
1871....	959,582 tons.	776,498 tons.	1,736,080 tons.
1872....	1,204,664 "	805,282 "	2,009,946 "
1873....	1,155,416 "	783,256 "	1,938,672 "
1874....	1,118,150 "	707,325 "	1,825,475 "

The principal articles of receipt and shipment are breadstuffs, live stock, provisions, cotton, lead (from the Missouri mines), hay, salt, wool, hides and pelts, lumber, tobacco, and groceries. The trade in dry goods is also extensive.

There are, including those in East St. Louis, six grain elevators and warehouses, five establishments for storing and compressing cotton, and two stock yards. The movement of breadstuffs for ten years has been as follows:

RECEIPTS.

YEAR.	Flour, bbls.	Wheat, bush.	Corn, bush.	Oats, bush.	Rye, bush.	Barley, bush.	Total grain (reducing flour), bush.
1865.....	1,161,088	8,452,722	3,162,313	4,173,229	217,568	846,229	17,657,252
1866.....	1,208,726	4,410,805	7,233,671	3,567,000	375,417	548,796	22,079,072
1867.....	944,075	3,571,593	5,155,430	3,485,388	250,704	705,215	17,848,755
1868.....	805,886	4,358,591	2,800,277	3,259,132	367,961	634,500	15,444,731
1869.....	1,210,555	6,736,454	2,395,713	3,461,844	266,056	757,600	20,170,442
1870.....	1,491,626	6,638,253	4,708,888	4,519,510	210,542	748,518	24,313,791
1871.....	1,428,408	7,311,910	6,030,734	4,358,099	374,336	876,217	26,093,336
1872.....	1,259,933	6,007,987	9,479,387	5,467,800	377,587	1,263,456	28,895,912
1873.....	1,296,457	6,185,033	7,701,187	5,359,853	356,580	1,153,615	27,243,558
1874.....	1,638,898	8,255,221	6,991,677	5,296,967	288,743	1,421,406	30,673,504

SHIPMENTS.

YEAR.	Flour, bbls.	Wheat, bush.	Corn, bush.	Oats, bush.	Rye, bush.	Barley, bush.	Total grain (reducing flour), bush.
1865.....	1,521,465	62,560	2,591,588	3,088,864	31,455	50,000	13,427,052
1866.....	1,700,740	635,517	6,759,199	2,624,044	225,458	89,751	18,835,969
1867.....	1,450,475	321,888	4,318,937	2,244,756	56,076	55,720	14,248,752
1868.....	1,499,337	542,234	1,611,613	1,952,579	192,555	64,426	11,860,097
1869.....	2,172,761	1,715,005	1,293,863	2,104,002	110,947	57,134	16,148,756
1870.....	1,790,739	634,562	3,636,060	3,144,744	100,254	70,451	21,039,776
1871.....	2,676,525	1,048,532	4,469,849	2,434,582	133,756	62,843	21,537,187
1872.....	2,247,040	918,477	8,029,739	3,464,594	150,208	87,566	23,885,734
1873.....	2,506,215	1,210,286	5,260,916	3,215,206	206,652	125,604	22,549,739
1874.....	2,981,760	1,938,341	4,148,556	3,027,663	166,133	227,418	24,417,411

St. Louis is noted for the manufacture of flour, being in this respect the first city in the Union. There were 24 mills in operation in 1874. The production for ten years has been as follows: 1865, 743,231 bbls.; 1866, 818,300; 1867, 765,298; 1868, 895,154; 1869, 1,068,592; 1870, 1,351,773; 1871, 1,507,915; 1872, 1,494,798; 1873, 1,420,237; 1874, 1,573,202. The movement of live stock and provisions for ten years was as follows:

LIVE STOCK.

YEAR.	RECEIPTS.		
	Cattle.	Sheep.	Hogs.
1865.....	94,307	52,133	99,663
1866.....	103,259	64,047	247,622
1867.....	74,146	62,974	293,241
1868.....	115,352	79,315	301,560
1869.....	124,565	96,626	344,848
1870.....	201,422	94,477	310,850
1871.....	199,527	113,899	633,370
1872.....	263,404	115,904	759,076
1873.....	279,673	86,434	973,512
1874.....	360,925	114,916	1,126,586

SHIPMENTS.

YEAR.	Cattle.	Sheep.	Hogs.
1865.....	46,712	8,680	17,869
1866.....	24,462	15,194	13,368
1867.....	26,799	19,022	28,627
1868.....	37,277	6,415	16,277
1869.....	59,867	12,416	39,076
1870.....	129,743	11,649	17,156
1871.....	130,018	37,465	113,913
1872.....	164,870	29,540	118,700
1873.....	180,662	18,302	224,873
1874.....	226,678	35,577	453,710

PROVISIONS.

YEAR.	RECEIPTS.		
	Pork, bbls.	Bacon and cut meat, lbs.	Lard, lbs.
1865.....	66,822	34,781,570	6,391,030
1866.....	56,740	31,278,150	5,004,870
1867.....	92,071	47,623,450	7,229,670
1868.....	85,127	46,753,350	5,941,650
1869.....	78,236	47,225,140	7,778,410
1870.....	77,398	44,494,770	6,215,150
1871.....	88,442	57,804,350	10,093,460
1872.....	60,207	63,434,860	11,288,890
1873.....	57,476	50,071,760	8,981,820
1874.....	55,453	52,104,380	6,877,560

SHIPMENTS.

YEAR.	Pork, bbls.	Bacon and cut meat, lbs.	Lard, lbs.
1865.....	109,702	64,910,870	9,569,830
1866.....	92,595	49,897,050	7,462,230
1867.....	133,226	70,095,130	14,318,210
1868.....	130,268	58,229,270	12,945,490
1869.....	120,002	75,755,450	13,322,900
1870.....	115,236	77,501,130	15,507,840
1871.....	131,732	123,665,060	30,750,470
1872.....	114,329	147,141,960	33,943,860
1873.....	105,876	134,392,770	37,156,510
1874.....	90,343	133,486,380	27,112,270

The number of hogs packed for a series of years has been as follows: 1869-'70, 241,316; 1870-'71, 305,600; 1871-'2, 419,032; 1872-'3, 533,000; 1873-'4, 463,793. The cotton trade has increased rapidly during the past few years. The receipts and shipments of cotton, together with the receipts and consumption of lead, for five years, are shown in the following table:

YEAR.	COTTON, BALES.		LEAD, PIGS.	
	Receipts.	Shipments.	Receipts.	Consumption.
1870...	11,372	6,692	237,089	205,600
1871...	41,512	35,782	229,961	226,654
1872...	29,436	19,039	285,769	222,907
1873...	83,439	70,949	356,037	255,938
1874...	185,943	122,694	479,448	200,000

St. Louis is a port of delivery in the customs district of New Orleans, and a port of entry under the act of 1870 permitting the shipment of foreign goods in bond to interior ports from the port of first delivery. The value of direct importations under this act in 1873 was \$1,120,455; in 1874, \$843,313. The value of foreign goods warehoused during the latter year was \$4,046,428; remaining in warehouse

on Dec. 31, \$276,547; amount of import duty collected during the year, \$1,674,116 53.—Notwithstanding the extent of its commercial interests, the prosperity of the city is chiefly due to its manufactures, in which it is surpassed only by New York and Philadelphia among the cities of the Union. The number of establishments in the county (mostly within the city limits), according to the United States census of 1870, was 4,579, employing 425 steam engines of 15,118 horse power, and 40,856 hands, of whom 32,484 were males above 16, 3,455 females above 15, and 4,917 youths; capital invested, \$60,357,001; wages paid during the year, \$24,221,717; value of materials used, \$87,388,252; of products, \$158,761,013. The particulars of some of the principal branches are contained in the following table:

INDUSTRIES.	No. of establishments.	Hands employed.	Amount of capital invested.	Value of materials used.	Annual value of products.
Agricultural implements.....	5	448	\$730,000	\$657,450	\$1,475,000
Bagging.....	2	333	1,200,000	423,100	750,000
Bags.....	5	814	505,000	1,442,500	5,007,250
Boots and shoes.....	145	709	876,900	957,580	1,990,940
Bakery products.....	185	799	654,260	1,963,784	2,936,085
Brick.....	85	1,253	1,046,746	374,879	2,768,372
Railroad cars.....	3	498	570,000	1,015,900	1,725,300
Street cars.....	3	72	105,000	86,000	202,000
Clothing, men's.....	366	3,077	2,139,425	3,311,626	6,665,617
" women's.....	181	823	243,425	597,800	1,011,420
Confectionery.....	12	281	272,000	541,890	1,189,155
Cooperage.....	152	1,165	742,450	932,265	1,949,630
Cotton goods.....	3	361	489,200	481,745	798,050
Flouring mill products.....	31	684	8,850,000	12,590,684	15,717,765
Furniture.....	105	1,507	2,362,000	1,464,980	3,635,659
Gas.....	1	156	1,815,000	342,000	1,329,250
Iron, forged and rolled.....	2	401	1,007,143	826,750	1,455,000
" anchors and cables.....	1	20	20,000	25,750	60,000
" nails and spikes.....	1	47	142,857	237,250	294,000
" railing, wrought.....	6	28	87,000	28,710	79,500
" pigs.....	4	734	880,000	813,000	1,945,000
" castings, not specified.....	3	146	95,000	445,620	659,050
" stoves, &c.....	17	1,564	2,762,500	1,416,775	2,987,950
Lead, bars and sheets.....	1	22	200,000	622,500	650,000
" pipe.....	2	12	52,500	128,000	167,000
Liquors, distilled.....	6	63	317,200	495,157	774,694
" malt.....	40	630	4,248,800	2,184,760	6,105,500
" vinous.....	4	68	541,200	606,730	813,750
Lumber, planed.....	5	94	194,000	298,125	488,500
" sawed.....	12	387	975,900	1,306,520	1,910,370
Machinery, engines and boilers.....	30	1,406	2,045,000	1,776,540	3,750,280
Malt.....	9	70	450,000	547,470	700,550
Stone work.....	76	485	309,600	454,820	1,076,355
Masonry.....	153	696	168,200	640,572	1,234,660
Matches.....	5	189	110,500	104,375	546,400
Pork, packed.....	12	530	3,237,000	8,544,094	11,443,845
Molasses and sugar, refined.....	1	302	2,000,000	3,667,000	4,135,250
Animal oil.....	3	77	525,000	2,866,100	4,100,000
Castor oil.....	1	88	825,000	355,000	500,000
Paints.....	8	220	970,000	1,549,043	2,088,000
Medicines.....	23	305	1,031,500	762,060	2,086,450
Printing, not specified.....	23	1,188	1,797,500	1,819,270	3,887,250
" newspaper.....	7	297	197,000	265,500	616,500
" job.....	20	193	192,500	195,650	406,700
Saddlery and harness.....	97	1,084	1,556,500	2,633,885	4,326,276
Sash, doors, and blinds.....	12	473	1,086,500	1,222,210	2,334,100
Soap and candles.....	7	260	1,067,500	1,277,730	1,767,500
Tin, copper, and sheet-iron ware.....	127	793	814,150	998,680	2,079,147
Tobacco and snuff.....	36	1,408	2,173,500	4,204,750	7,620,940
" cigars.....	264	1,185	470,260	712,692	1,765,598
Zinc, smelted.....	2	93	280,000	51,540	162,400

There has been a large increase since 1870 in nearly all branches of manufacture except iron, which since the panic of 1873 has declined; the value of products for 1874 has been estimated at nearly \$240,000,000. Extensive Bessemer steel works are now (1875) in course of erec-

tion. There are 7 national banks, 19 state banks, and 30 savings institutions, with an aggregate capital of about \$20,000,000. On July 1, 1874, the aggregate deposits were \$42,088,-214 59; loans and discounts, \$48,544,501 51; cash and exchanges, \$11,903,758 03. The city

contains a safe deposit company and 31 insurance companies, of which five are life insurance companies. There are a chamber of commerce, a merchants' exchange, a board of trade, a cotton exchange, a mechanics' and manufacturers' exchange, and a mining exchange.—St. Louis is divided into 12 wards, and is governed by a mayor and a city council composed of two members from each ward, elected biennially. There are also a comptroller, treasurer, and auditor. The United States courts for the E. district of Missouri and terms of the state supreme court are held here. The special city courts are the court of criminal correction and four police courts. The headquarters of the United States army were established here in 1874. The police force is under the control of five commissioners, including the mayor *ex officio*, whose jurisdiction extends over 30 sq. m. of territory beyond the limits of the city. The force on April 1, 1875, numbered 462 officers and men. The fire department comprises 18 engine companies, 14 hose companies, and three hook and ladder companies; the number of men is 150. The water supply of the city is taken from the Mississippi at Bissell's point, near the N. boundary. It is raised into four reservoirs, each 240 by 660 ft., with an average depth of about 20 ft., by two pumping engines, each with a capacity of 17,000,000 gallons a day. In these reservoirs it remains 24 hours, to free it from sediment. It then passes into a small reservoir near the two high-service engines, which raise it to the storage reservoir, covering about 17 acres on Compton hill, 26 ft. above the highest street grade. The board of health consists of five members, including the mayor as president *ex officio*. It is asserted that St. Louis is one of the healthiest cities in the country. The number of deaths for eight years, according to the health officer's report, has been as follows: 1867, 6,167, or 28·2 per 1,000; 1868, 5,193, 20·6; 1869, 5,884, 20·6; 1870, 6,670, 21·3; 1871, 5,265, 16·8; 1872, 8,047, 18·2; 1873, 8,551, 21·36; 1874, 6,506, 14·45. Of the deaths in 1874, 30·43 per cent. were from zymotic, 18·29 from constitutional, 41·74 from local, and 6·56 from developmental diseases, and 2·99 per cent. from violence. The number of deaths from consumption was 581, being 8·93 per cent. of the whole. The assessed value of property in 1864 was \$63,059,078; in 1874, \$172,109,270. The balance in the treasury on April 14, 1874, was \$289,404 20; receipts during the following year, \$6,003,819 56, of which \$2,236,121 86 were from taxes, 2,005,120 from the sale of bonds, \$1,150,000 from temporary loans, and \$612,577 70 from miscellaneous sources; expenditures, \$6,231,286 72, of which \$372,000 were for the payment of matured bonds, \$1,035,631 38 of interest on debt, \$1,450,000 of temporary loans, and \$3,373,665 34 for other purposes; balance, April 12, 1875, \$61,937 04. The bonded debt on April 13, 1875, was \$15,-

993,000, on which the annual interest is \$950,710; temporary debt, \$1,027,000. The assets of the city on the same date amounted to \$13,044,315 38, including, besides a sinking fund of \$738,126 65, the water works, engine houses, public parks, &c. There are 2·61 m. of paved and macadamized wharf, 220·81 m. of macadamized streets, 10·2 m. of Nicolson pavement, 40·68 m. of improved alleys, 162 m. of sewers, and 160 m. of water pipe. The public institutions not already mentioned are the workhouse, house of refuge, female hospital, city dispensary, and quarantine hospital. Under the management of various societies, there are 9 hospitals and 27 asylums and homes, including a deaf and dumb asylum conducted by the sisters of St. Joseph, and St. Vincent's insane asylum.—The public schools of St. Louis are under the control of a board of 24 members, two from each ward, which appoints a superintendent and two assistants. There are three courses of study, viz.: the normal school course, for females only, two years; the high school course, four years; and the district school course, eight years. There are also separate schools for colored children, and evening schools, the O'Fallon polytechnic institute serving as an evening high school. German is taught in the district schools to such pupils as elect to study it. According to the school census taken in April, 1874, there were 138,133 persons from 5 to 21 years of age inclusive, of whom 95,539 were from 6 to 16; there were 33,511 attending public schools and 21,789 attending private schools; total attending school, 55,300. In 1866 there were only 30 school houses, with 11,055 seats; number of pupils enrolled, 16,228; average attendance, 9,597; average number of teachers, 236; total expenditures, \$331,694 36. In 1874-'5 there were 57 day schools (1 normal, 6 high and branches, 44 district, 6 colored); number of pupils enrolled, 35,941; average attendance, 24,438; number of teachers, 654; number of evening schools, 21; pupils enrolled, 5,751; average attendance, 2,644; teachers, 115; number of school houses, 56; rooms, 525; seats, 30,070; value of school lots, \$715,736; of school buildings and furniture, \$1,715,230; expenditures, \$792,019 37, of which \$522,350 09 were for teachers' salaries, \$44,345 57 for permanent improvements, and \$225,323 71 for current expenses. The public school library contains about 38,000 volumes, and has a good reading room; it is open to the public for consultation. Several scientific and other societies have merged their collections with it. There are about 70 parochial schools, under the management of the Roman Catholics and other denominations, and a number of academies and private schools, including one for the deaf and dumb. There are also seven medical colleges and a college of pharmacy. The St. Louis university, under the direction of members of the society of Jesus, was founded in 1829, and incorporated in 1832.

It has a very valuable museum, philosophical and chemical apparatus, and a library of more than 16,500 volumes. The select libraries open to the students form a separate collection of more than 8,000 volumes. The university has a classical course of six years, a commercial course of four years, and a preparatory class. The number of instructors in 1874-'5 was 22; of students, 353. Washington university, incorporated in 1853, is intended to embrace the whole range of university studies, except theological. It comprises the academy, essentially a preparatory school to the higher departments, with a primary class; the Mary institute, organized in 1859; the college, 1859; the O'Fallon polytechnic institute, or polytechnic school, 1857; and the St. Louis law school, 1867. The college course is similar to that of other American colleges. The Mary institute is a female seminary, with studies of all grades. In the polytechnic school there are five regular courses, each occupying four years, viz.: civil engineering, mechanical engineering, chemistry, mining and metallurgy, and building and architecture. An evening school is conducted by the O'Fallon institute under the supervision and control of the board of public schools. The number of instructors and students in the different departments in 1874-'5 was as follows:

DEPARTMENTS.	Instructors.	Students.
Academy	23	321
Mary institute.....	17	260
College	5	30
Polytechnic school (exclusive of evening school).....	13	32
Law school.....	8	57
Total (deducting repetitions) ..	58	700

The college has a library of 5,500 volumes, the polytechnic school one of 30,000 volumes, and the law school one of upward of 2,500 volumes. The college of the Christian Brothers (Roman Catholic) was chartered in 1855 and organized in 1859. It has a library of 10,000 volumes. Concordia college and theological seminary (German Evangelical Lutheran) was organized in 1839 and chartered in 1853. It has a library of 4,500 volumes. The Missouri institution for the education of the blind was established in 1851. The academy of science, founded in 1856, has a large museum and a library of 3,000 volumes. Other libraries are the mercantile, 43,000 volumes; St. John's circulating library, 27,000; and the law library, in the court house, 7,100. The Missouri historical society, established in 1865, has a large historical collection. The newspapers and periodicals are as follows: 10 daily (4 German), 4 tri-weekly, 1 semi-weekly, 32 weekly (5 German), 5 semi-monthly (1 German), 28 monthly (2 German), 1 bi-monthly, and 3 quarterly. There are 162 churches and missions, viz.: 16 Baptist (6 colored), 3 Christian, 4 Congregational, 15 Episcopal (1 colored),

1 Evangelical Lutheran, 1 Free Methodist, 1 Friends', 9 German Evangelical, 12 German Evangelical Lutheran, 2 Independent Evangelical Protestant, 4 Jewish, 13 Methodist Episcopal (4 colored), 9 Methodist Episcopal, South, 2 New Jerusalem (1 German), 23 Presbyterian, 38 Roman Catholic, 2 Unitarian, and 7 miscellaneous.—In 1762 M. d'Abbadie, director general of Louisiana, granted to a company of merchants, of whom Pierre Liguette Laclède was the leader, the exclusive right of trade with the Indians on the Missouri. This company after careful examination established themselves on the present site of St. Louis, Feb. 15, 1764, and erected a large house and four stores. In 1770 the number of settlers had increased to 40 families, and a small garrison was maintained. On Aug. 11, 1768, a company of Spanish troops under Capt. Rios took possession of it in the name of the king of Spain, under whose sway it remained till the cession of Louisiana in 1800 to France, which in 1803 sold the territory to the United States. In 1780 an unsuccessful attack, supposed to have been instigated by the British, was made upon it by a considerable body of Indians. For many years it was only a trading post for the fur traders, and the furs collected there reached an annual value of about \$200,000 at the beginning of the present century. It was incorporated as a town in 1809. The first newspaper was published in 1808, the first brick house erected in 1813, and the first bank established in 1816. In 1817 the first steamboat arrived, and the same year the first board of school trustees was formed. In 1822 St. Louis was chartered as a city. The growth of Illinois, which began to be rapid after 1825, gave St. Louis its first great impulse; and the ascent of steamers to the Great falls soon created a thriving trade, which began to assume magnificent proportions in 1840. The city suffered from cholera in 1832, and from cholera and fire in 1849. In 1851 the first railroad was begun, and to the extension of its railroad facilities is mainly due its rapid growth since that date. By a legislative act of 1867, taking effect in 1870, Carondelet, adjoining it on the south, was annexed to the city.

SAINT LUCIA, an English island of the West Indies, in the Windward group, between St. Vincent and Martinique, crossed by the parallel of 14° N. and the meridian of 61° W.; length 26 m., breadth 11 m.; area, 248 sq. m.; pop. about 33,000. The surface is mountainous, with a small plain near the S. end and marshes on the coast. Two conical mountains rise abruptly out of the sea on the W. side to elevations of 2,680 and 2,710 ft.; an extinct volcano 1,000 ft. high, containing an inexhaustible mass of sulphur, occupies the S. W. part of the island. The soil is fertile; the mountains are clothed with forests containing valuable timber and dyewoods; the valleys are well watered, yielding abundant crops of sugar cane and cacao. The average annual value

of exports is \$812,000; of imports, \$630,000. The climate is warm, damp, and unhealthy, and destructive hurricanes occur. The chief town, Castries, is on the shore of an excellent harbor on the W. coast, 9 m. from the N. end. The island was first settled in 1605 and 1639 by English colonies, and has been several times taken by the French, but the English have held possession since 1803.

SAINT-MALO, a fortified town of Brittany, France, in the department of Ille-et-Vilaine, on the rocky peninsula of Aron, near the mouth of the Rance in the bay of St. Malo, 40 m. N. N. W. of Rennes; pop. in 1872, 12,316. It is connected with the mainland by a causeway called the Sillon. The harbor is large and safe, but encumbered by shoals at its entrance, and the tide rises sometimes to the height of 45 ft., while at low water the port is dry. The town is largely engaged in fisheries, and has an active trade with England. The cargoes cleared in 1874 from St. Malo and the adjoining port of St. Servan, in sailing ships only, amounted to 4,402,600 francs. Lamennais was born here, as also Chateaubriand, whose tomb is on a rock in the harbor. A monument to him by Millet was erected Sept. 5, 1875, in the place St. Vincent, since known as place Chateaubriand.

SAINT-MARC GIRARDIN. See GIRARDIN.

SAINT MARTIN, a S. parish of Louisiana, bordered E. by Atchafalaya and Grand rivers, S. W. by Chetimaches lake, and intersected by Teche bayou; area, about 500 sq. m.; pop. in 1870, 9,370, of whom 5,064 were colored. The surface is level and the soil fertile. The chief productions in 1870 were 192,840 bushels of Indian corn, 9,898 of sweet potatoes, 3,428 bales of cotton, 1,494 hogsheds of sugar, and 75,740 gallons of molasses. There were 2,413 horses, 1,372 mules and asses, 3,101 milch cows, 7,401 other cattle, 3,769 sheep, and 5,109 swine, and 30 molasses and sugar establishments. Capital, St. Martinsville.

SAINT MARTIN, an island in the N. E. angle of the West Indian archipelago, 5 m. S. of Anguilla, in lat. 18° 5' N., lon. 63° 3' W.; area, about 30 sq. m.; pop. about 6,600. The shore is deeply indented, and the surface hilly, the summit being 1,360 ft. above the sea. The soil is not rich; the climate is warm but healthy. The northern part (pop. 3,600, area, 13,166 acres) belongs to France; one third of it is cultivated, yielding annually 2,000,000 lbs. of sugar, 25,000 gallons of molasses, and 50,000 of rum. The southern part, belonging to Holland (pop. 3,000), is less fertile, but yields annually 2,500,000 lbs. of sugar, 130,000 gallons of rum, great quantities of salt collected from marshes bordering the coast, and fine tobacco. Mari-got is the capital of the French, Philipsburg of the Dutch colony. The island was first settled in 1638 by both nations.

SAINT MARTIN, Alexis. See BEAUMONT, WILLIAM.

SAINT-MARTIN, Louis Claude, marquis de, a French metaphysician, born in Amboise, Jan.

18, 1743, died near Paris, Oct. 13, 1803. For a while he practised as an advocate at Tours, but in 1765 was a lieutenant in a regiment in garrison at Bordeaux, where he became interested in mystical speculations, and subsequently studied the works of Jakob Boehm and Swedenborg. In 1771 he left the army and went to Lyons, where he published his first book, *Des erreurs et de la vérité, par un philosophe inconnu* (1775), a refutation of the theories of materialism. He spent some years in Paris, visited England in 1786 and Italy in 1787, and after his return resided in Strasburg till 1791, then in Amboise till 1795, when he returned to Paris. His principal works are: *Tableau naturel des rapports qui existent entre Dieu, l'homme et l'univers* (Lyons, 1782), showing that we must explain things by man and not man by things; *L'Homme de désir* (1790); *Ecce Homo* (1792); *De l'esprit des choses* (1800); and *Le ministère de l'homme-esprit* (1802).—See his *Correspondance* with Kirchberger (Paris, 1862), and *Saint-Martin, le philosophe inconnu*, by Matter (1862).

SAINT MARY, a S. parish of Louisiana, bordered S. W. by several bays of the gulf of Mexico, and N. E. by Lake Chetimaches, and drained by Atchafalaya and Teche bayous; area, 860 sq. m.; pop. in 1870, 13,850, of whom 9,607 were colored. The surface is flat and marshy, and the soil highly fertile. The chief productions in 1870 were 186,842 bushels of Indian corn, 11,882 of sweet potatoes, 69,327 lbs. of rice, 6,591 hogsheds of sugar, and 341,445 gallons of molasses. There were 958 horses, 1,861 mules and asses, 3,717 cattle, 1,704 sheep, and 2,960 swine; 25 manufactories of cooperage, 2 of machinery, 5 of brick and stone, 31 of molasses and sugar, and 7 saw mills. Capital, Franklin.

SAINT MARY'S, a S. county of Maryland, bounded N. E. by the Patuxent, E. by Chesapeake bay, and S. W. by the Potomac; area, about 250 sq. m.; pop. in 1870, 14,994, of whom 7,726 were colored. It has numerous bays and creeks; the surface is nearly level. The chief productions in 1870 were 152,630 bushels of wheat, 274,457 of Indian corn, 44,379 of oats, 2,522,917 lbs. of tobacco, and 9,809 of wool. There were 2,577 horses, 2,260 milch cows, 5,714 other cattle, 3,982 sheep, and 11,302 swine. Capital, Leonardtown.

SAINT MARY'S STRAIT, or **River**, the connecting link between Lake Superior and Lake Huron, forming also the boundary between Ontario, Canada, and the upper peninsula of Michigan. Beginning at the head of Tequamenon bay, a frith of Lake Superior, the strait holds a general S. E. course of 63 m. to the head of Drummond island, in Lake Huron. One mile below Lake Superior are the rapids known as St. Mary's falls or Sault de Ste. Marie, and below these the strait spreads out into a broad lake. It is navigable up to the rapids for the largest vessels. These rapids have within the space of three quarters of a

mile a fall of 22 ft. A ship canal around the falls was completed May 19, 1855, the greater part of which is cut through solid rock. (See CANAL, vol. iii., p. 687.)

SAINT-MAUR, Congregation of, a congregation of reformed Benedictines in France. Their body was organized in 1618, and confirmed in 1621 and 1627. It comprised at one time about 124 houses, was divided into seven provinces, and was governed by a general residing in Paris. Literature owes to this congregation the best collective editions of the Greek and Latin fathers. Montfaucon, Mabillon, and Ruinart belonged to it. The congregation was broken up by the French revolution. In 1833 the convent was restored at Solesme in the diocese of Le Mans.

SAINT MAURICE, a river of Quebec, Canada, rising on the N. border of the province, and emptying into the St. Lawrence at Three Rivers, after a tortuous S. course of more than 400 m. Its banks are generally high, in some places from 200 to 1,000 ft., and are covered with groups of majestic trees. It expands into numerous lakes, contains several islands, and has a great variety of cascades and falls. The falls of Grande Mère and the Shawenegan falls, about 30 m. from its mouth, are particularly attractive. It is navigable for a few miles near its mouth, and after an interruption of about 40 m. there is another navigable stretch of 75 m. Its chief tributaries are the Manouan, Ribbon, Flamand, Vermilion, Rat, Mattawin or Mattuin, and Shawenegan from the west, and the Windigo, Trenche, Grande Pierriche, Croche, Grand Bostonnais, Petit Bostonnais, and Mekinak from the east.

SAINT MAURICE, a county of Quebec, Canada, bounded S. E. by the St. Lawrence, just below Lake St. Peter; area, 2,585 sq. m.; pop. in 1871, 10,658, of whom 10,519 were of French origin or descent. It extends N. W. from the river to the limits of the province, and is watered by several lakes and streams. Capital, Yamachiche.

SAINT MICHAEL (Port. *São Miguel*), the largest island of the Azores, in the North Atlantic ocean; extreme length 50 m., breadth of main parts 5 to 12 m.; area, 224 sq. m.; pop. about 115,000. The surface is mountainous, the highest peak, Vara, being 3,570 ft. above the sea. It is of volcanic origin, and contains warm mineral springs. The climate is temperate and equable; the thermometer ranges from 48° F. in January to 84° in July; the extremes, 45° and 86°, are of rare occurrence. The soil is fertile, yielding tropical and temperate plants equally well. The orange, pineapple, banana, and sugar cane are extensively cultivated. The annual value of oranges exported to England is about \$425,000; the total value of exports is \$450,000; of imports, \$500,000. Capital, Ponta Delgada.

SAINT MORITZ (Ger. *Sanct-Moritz*), a watering place of the canton of Grisons, Switzerland, in the Engadine valley, on the right bank

of the Inn, about 6,000 ft. above the sea and close to Lake St. Moritz. One of the two principal springs is named after Paracelsus, who visited the place, and the other is called St. Moritz. The water is chalybeate, abounding with carbonic acid, and is used for drinking and bathing, being heated for the latter purpose. It is considered stronger than that of Schwalbach and Pyrmont. The season lasts from June to September.—See "A Season at St. Moritz," by Dr. Burney Yeo (London, 1870), and *Der Kurort St. Moritz und eine Eisensäuerlinge*, by Dr. August Husemann (Coire, 1874).

SAINT-NAZAIRE, a town of France, in the department of Loire-Inférieure, on the right bank and at the mouth of the Loire, on a promontory between that river and the ocean, 30 m. W. of Nantes; pop. in 1872, 13,536. It consists of an old and a new town; the latter has grown up since the establishment of a floating dock in 1845, as an accessory harbor for large ocean vessels, which cannot enter Nantes. It is a station for the transatlantic steamers to West Indian and other ports.

SAINT-NICOLAS, a town of Belgium, in the province of East Flanders, 20 m. E. N. E. of Ghent; pop. about 22,000. It manufactures woollen goods, shawls, and linen, and is one of the greatest flax markets in the world.

SAINT-OMER, a town of France, in the department of Pas-de-Calais, at the junction of the canal of Neuf-Fossé with the river Aa, 130 m. N. of Paris; pop. in 1872, 22,381. It is strongly fortified and has an important artillery arsenal. It is the seat of an archbishop, and has a fine Gothic cathedral of the 14th century. There are also interesting remains of a Benedictine abbey, founded by St. Omer in the 7th century. Woollen goods, paper, leather, hats, distilled liquors, starch, and beet-root sugar are manufactured; and there is a trade in grain, wines, oil, brandy, and coal. A seminary for the education of English and Irish Roman Catholics still exists, taking the place of the celebrated English Jesuit college.

SAINT PAUL, a city and port of delivery, capital of the state of Minnesota and of Ramsey co., on the Mississippi river, 2,200 m. from its mouth, 8 m. in a direct line E. S. E. of the falls of St. Anthony, and 350 m. N. W. of Chicago; lat. 44° 52' 46" N., lon. 93° 5' W.; pop. in 1860, 10,401; in 1870, 20,030; in 1875, about 36,000. It was formerly confined to the left bank, the site embracing four distinct terraces, forming a natural amphitheatre with a southern exposure, and conforming to the curve of the river, which, here flowing N. E., by an abrupt circular sweep takes a S. E. course. The city is built principally upon the second and third terraces, which widen into level, semicircular plains, the last, about 90 ft. above the river, being underlaid with a stratum of blue limestone from 12 to 20 ft. thick, of which many of the buildings are constructed. The original town is regularly laid out, but the newer por-

tions are irregular. The principal public buildings are the capitol and the custom house, the latter including the post office. By vote of the people of Ramsey and Dakota counties, a portion of the territory of the latter, on the opposite bank of the river, embracing what was known as "West St. Paul," was ceded to St. Paul in November, 1874. This adds to the city about 3,000 acres, constituting the sixth ward, and from 1,200 to 2,000 people. The statistics below are exclusive of this addition. Tables of mortality show St. Paul to be one of the healthiest cities in the United States. A beautiful tract of 300 acres, lying on the shore of Lake Como, has been secured for a public park. St. Paul is remarkable for the expansion of its wholesale business. This trade in 1869 reached a total of \$7,500,000; in 1871, \$12,890,029; and in 1873, \$19,459,246. It is the centre of 11 railroads, over which arrive and depart 96 trains daily, viz.: the Lake Superior and Mississippi; Stillwater and St. Paul; St. Paul,

Stillwater, and Taylor's Falls; West Wisconsin; North Wisconsin; Chicago, Milwaukee, and St. Paul; St. Paul and Chicago; Burlington, Cedar Rapids, and Minnesota; St. Paul and Sioux City; and St. Paul and Pacific (two branches). It is the practical head of navigation on the Mississippi river, 5 m. below the mouth of the Minnesota, its most northerly navigable tributary. An average of 50 steamboats and 100 barges trade with this port, comprising a total carrying capacity of 45,000 tons, operated by 1,630 men. The average length of the season of navigation is $7\frac{1}{2}$ months, and the number of steamboat arrivals about 815 annually. There were in 1873 six national banks, with an aggregate capital of \$2,150,000, three private banks, and a savings bank. The average daily deposits were \$3,432,141; loans and discounts, \$3,603,079; and sales of exchange, \$30,987,024. There are a fire and marine and a life insurance company. The total assessed valuation of real and personal prop-



Saint Paul.

erty in 1874 was \$27,444,047, about 50 per cent. of its actual value. The total bonded debt was \$1,140,254, and the total tax levy $2\frac{1}{4}$ per cent. The principal manufactures are agricultural implements, sash, doors, and blinds, printing and blank books, ale and beer, boots and shoes, and wagons and carriages. The capital invested in manufactures in 1873 was \$3,500,000, the number of persons employed 2,646, and the value of manufactured articles \$5,350,000. There are two extensive grain elevators, one of which, completed late in 1874, is the largest in the state. In 1873 there were shipped 1,458,800 bushels of wheat and 180,112 bbls. of flour. The city is divided into six wards, and is governed by a mayor and a council of three members from each ward. The police force is under a chief, appointed by the mayor. The streets are lighted with gas, well graded and partially paved, and a system of sewerage is in progress. The city is supplied with water from Lake Phalon, 3 m. distant. It has a paid fire department and a fire-alarm

telegraph. Two lines of street railway, 4 m. in extent, are in operation. In 1873 there were published four daily, four tri-weekly (one German), and 12 weekly (two German, one Swedish, and one French) newspapers, and two monthly periodicals. There are ten public school buildings, which cost \$300,000. The number of departments is 55, and of teachers 73. The total enrolment of pupils for 1874 was 3,833, average enrolment 3,000, average daily attendance 2,586. There are also a female seminary and several private schools of high grade. The Roman Catholics have several institutions of learning, and have recently secured a large tract of land in the vicinity for an industrial school. The state reform school is located here. There are a commercial and business college, an academy of natural sciences containing 126,000 specimens, and a state historical society. The city contains four public and four private circulating libraries, the former including the state law library and those of the historical society and academy of sci-

ences, and comprising together about 24,000 volumes. The charitable institutions include a Catholic and a Protestant orphan asylum. The number of churches is 38, viz.: 3 Baptist, 1 Congregational, 4 Episcopal, 3 Evangelical, 1 Jewish, 5 Lutheran, 7 Methodist, 4 Presbyterian, 7 Roman Catholic, 1 Swedenborgian, 1 Unitarian, and 1 Universalist.—The first building was erected on the site in 1838, and it was simply an Indian trading post for several years. It was laid out into village streets in 1849, and a city government was obtained in 1854, when it contained about 3,000 inhabitants. It derived its name from that of a log chapel dedicated to St. Paul by a Jesuit missionary in 1841.

SAINT PAUL DE LOANDA, a decaying city of Angola proper, and the seat of government of the Portuguese possessions in Lower Guinea, a few miles S. of the mouth of the river Bengo; pop. about 12,000. It contains the ruins of two cathedrals, one of which was used as a college by the Jesuits in the 17th century. The harbor, formed by a low sandy island, is protected by three forts.

SAINT PETER, a city and the county seat of Nicollet co., Minnesota, on the W. bank of the Minnesota river, at the junction of the Winona and St. Peter and the St. Paul and Sioux City railroads, 75 m. S. W. of St. Paul; pop. in 1870, 2,124; in 1875, 3,310. It contains several furniture manufactories, three cooper shops, two grist mills, two sash, door, and blind factories, a marble shop, a foundery and machine shop, three breweries, and a national bank. There are a large graded school, with 11 departments and 750 pupils; a Roman Catholic school, with 75 pupils; two weekly newspapers, and 10 churches. The state hospital for the insane, completed in 1875, is of limestone quarried on the ground, and cost \$500,000. The Swedish Lutherans of Minnesota are erecting (1875) a large building for a college.

SAINT PETERSBURG, a N. W. government of Russia, bounded N. by the gulf of Finland, the government of Viborg, and Lake Ladoga, E. by Novgorod, S. by Pskov, and W. by Lake Peipus, which separates it from Livonia and Esthonia; area, 20,760 sq. m.; pop. in 1870, 1,325,471. It is drained by the Neva, Luga, and Narva, which discharge their waters into the gulf of Finland, and the Volkhov, Svir, and other streams, which flow into Lake Ladoga. The surface is low and flat, and in many places swampy, but there are some low hills in the northeast, and a spur of the Valdai mountains enters it on the south. The climate is severe, and the soil mostly barren. It nearly corresponds to the former province of Ingria, and was the principal theatre of the long wars between the Swedes and the Russians. Peter the Great finally conquered it, and it was secured to Russia by the peace of Nystad in 1721. In 1871 the city of St. Petersburg was erected into an administrative district by itself, which left in the old government about 500,000 inhabitants.

SAINT PETERSBURG, the capital of Russia, situated on and around the delta of the Neva, in lat. 59° 56' 30" N., lon. 30° 19' E., 13 m. E. of its port of Cronstadt, and 390 m. N. W. of Moscow; pop. in 1870, 667,026, including 76,831 Protestants and 20,882 Roman Catholics, more than 40,000 Germans, and many other foreigners. The Neva, as it approaches the gulf of Finland, turns first N. and then W., and soon divides into the Great and Little Nevka, and the Great and Little Neva. Beginning at the north, the first two enclose the Velaginski, Kamennoi, and Krestovski islands; between the Great Nevka and the Neva lies the large Aptekarski island; Citadel island is in the Neva; Petrovski island and several islets are between the Little Nevka and the Little Neva; while S. of the Little Neva and between it and the Great Neva are Volni and Vasili islands, the latter the largest of the delta. S. E. of this in the peninsula (converted into islands by canals) formed by the bend of the Neva is the admiralty quarter of the city. All these islands are included within the limits of the city, and the larger are very populous. They are connected with the peninsula and with each other by ten bridges, several of them very fine. Beyond the Neva at the east there is a large and rapidly growing suburb. The Neva, though broad and clear, is shallow, and a bar at its mouth forbids the passage of vessels drawing more than 9 ft. of water; and though the hulls of large ships are built at the city dockyards, they are floated to Cronstadt for their masts, rigging, and cargoes or armament. The city is not liable to an attack by sea, but it has no adequate defences against an approach by land.—The peninsular part S. of the Neva, with the finest buildings and streets, is called the Bolshaya Storona or Great side; the islands and settlements on the N. bank are collectively known as the Petersburg side. On the latter side, opposite the so-called English quay, are the exchange and most of the important docks and warehouses. The city is elevated but little above the Neva, which has more than once overflowed and caused great destruction of life and property. The peninsula, or Great side, is drained by canals, the principal of which are the Moika, the Catarina, the Fontanka, and the Zagorodnoi, connected with each other and with the Neva by cross canals. The banks of the principal canals are protected by walls of hewn granite, and crossed by numerous bridges. The quays along the Neva are of great extent and solidity. The admiralty building, on the S. side of the Great Neva, is an immense and massive pile with a lofty dome and spire, and is the central point of the S. or Great side. The statue of Peter the Great is on its S. W. side, and the column of Alexander I. on the N. E. From the galleries of this building the whole city can be seen. Radiating from it S. E., S. S. E., and S. are the three finest streets of the city, viz.: the Nevski Prospekt or Neva per-

spective, the Gorokhovaya Ulitza or Peas street, and the Voskresenski Prospekt or Resurrection perspective. The Neva perspective, 130 ft. broad and about 4 m. long, is one of the finest streets in Europe. It contains the cathedral of Our Lady of Kazan, profusely adorned with silver, gold, and gems, but without much architectural merit, and another Greek church, both with their blue domes decorated with stars; a Dutch church, a Protestant German church, a Catholic and an Armenian church, all costly and some of them very beautiful. Here too are the military headquarters, the palace of the archduke Michael, the great bazaar with its 10,000 merchants, the institution of St. Catharine, and a theatre. At the end of this street and near the city limits are the convent and church of St. Alexander Nevskoi, the latter containing a sarcophagus

the citadel, with a tall, slender, richly gilt spire, 208 ft. high, which can be seen from all parts of the city or its suburbs, contains the



Winter Palace.

remains of all the Russian monarchs since Peter the Great. The Isaac church, S. W. of the admiralty, in one of the largest open spaces of the capital, is celebrated for its simple but



The Isaac Church.

of pure silver in which the body of the saint is preserved, and the palace of the metropolitan. The church of St. Peter and St. Paul in

grand architecture, its noble proportions, and its imposing porches. Like the Greek churches generally, it is in the form of a Greek cross, and has four grand entrances, each approached by three broad flights of steps, each entire flight composed of a single piece of granite. Each entrance has a superb peristyle composed of monolithic columns of polished granite, each 60 ft. high and 7 ft. in diameter, and the whole surmounted by a cupola 120 ft. above the peristyles, covered with copper and richly gilt, and resting on 30 granite pillars. The foundation of this church, formed of several successive tiers of piles, is said to have cost \$4,000,000. The church of the Smolnoi convent, in the N. E. part of the peninsula, is of white marble, and is surmounted by five blue domes spangled with

golden stars. The Preobrazhenskaya church belongs to one of the oldest regiments of the guards, and is profusely decorated with-

in and without with military trophies. The English church, W. of the admiralty, is richly ornamented.—St. Petersburg is a city of palaces. The Winter palace is said when the emperor occupies it to have more than 6,000 inhabitants. It was burned in 1837, and rebuilt in 1839 on a more magnificent scale. It is one of the largest palaces in the world, and is in the form of a square, 455 ft. long and 350 ft. broad. Its halls are of wonderful beauty, and filled with the richest statuary, gems, and pictures, and magnificent tables and vases of malachite. The Hermitage, built by Catharine II., is connected with the Winter palace, and contains 40 rooms of paintings, a museum of statuary, arms, and gems, a theatre, and a library with many engravings. The marble palace, a massive, gloomy-looking building, lies near Troitzkoi or Trinity bridge, considerably E. of the Hermitage. A mile further E., on the banks of the Neva, is the Taurida palace, which has a ball room 320 ft. long and 70 ft. wide. The Annitchkoff palace, the favorite residence of the emperor Nicholas, is on the Neva perspective near the Fontanka canal. One of the finest new palaces is that of the grand duke Vladimir, completed in 1871. The government buildings are remarkable for their immense size, and some of them possess great architectural beauty. The principal are the admiralty, half a mile long and with two wings 650 ft. in length, the holy synod, the headquarters of the ecclesiastical direction of the Greek church, the *hôtel de l'état major*, and the war office; and on the opposite side of the Great Neva, on Vasili island, the exchange and custom house, both imposing edifices; on Citadel island, the citadel and the mint; and further down the river, on Vasili island again, the *hôtel des mines*, the academy of arts, the academy of sciences with its museum and observatory, and the fine barracks of the cadets.—The imperial library contains 1,100,000 volumes and 35,000 manuscripts, many of them of great value. The academy of sciences and the Hermitage have 120,000 volumes each. The academy of sciences, founded by Peter the Great under the direction of Leibnitz, has Asiatic, Egyptian, and ethnographic museums, and numismatic, anatomical, mineralogical, and other collections; in 1873 it was attended by 303 students. The academy of arts, recently much improved under the direction of Prince Gagarin, is noted for its galleries of pictures and sculptures. The museum of the mining school has a celebrated collection of minerals, and the Rumiantzeff museum of oriental objects. One of the most prominent learned bodies is the imperial geographical society. The university was founded in 1819, and in 1872 had 1,413 students. There are several colleges and special schools and institutions of all grades. Female gymnasia and a female normal school were opened in 1873, and new compulsory schools at the end of 1874. St. Petersburg has many extensive char-

itable institutions, including the famous foundling hospital. (See **FOUNDLING HOSPITAL**.) The Gostinnoi Dvor, the principal market, is a colossal pile of buildings, with many shops and warehouses, resembling a perpetual fair. The Great theatre for Italian opera, and the Michael for French and German plays, are most frequented; the Marie and Alexander are for Russian performances. The English club, called so after the original founders, though now not much frequented by Englishmen, is the principal one; the most exclusive is the imperial yacht club. The principal park is the Summer gardens; military reviews are held on an adjoining square. At the entrance of the park is a chapel erected in 1866 to commemorate the escape of the present emperor from assassination. The city is deserted in summer by the nobility. In winter it is one of the most brilliant and also most expensive capitals of Europe.—The mean annual temperature of St. Petersburg is 39° F.; the mean summer temperature is 62°, that of winter 18°. The extremes are 99° and -51°. The cold is very severe, but, protected by furs, the residents do not feel it so much as in milder climates. But the sanitary condition of the city is unsatisfactory, owing to the cellars of nearly all the houses being inhabited. The number of fever patients in the hospitals in the beginning of 1875 exceeded 10,000, or about 1 in 70 of the population, besides the sick in private houses, few of which were at that period free from typhus fever. The imperial manufactories of Gobelin tapestry, of glass, porcelain, malachite and other precious stones, military surgical instruments, and embroideries, are on a large scale. There are also extensive foundries of cannon, and manufactories of cotton, silk, muslin, and woollen goods, leather, fringes, paper, tobacco, soap, clocks, jewelry, &c. The commerce has received a new impulse from the opening of the Finland and Baltic roads, and about 3,000 vessels now arrive and depart annually. St. Petersburg is also the centre of the Russian book trade. The docks were in 1875 connected by rail with Moscow and other cities, and a canal to Cronstadt is expected to be completed in 1879.—St. Petersburg was founded May 27, 1703, by Peter the Great. He first erected a fortress on the site of the present citadel, and such were the obstacles with which he met in the treacherous character of the soil, the climate, and the insalubrity of the location, that a man of less resolute will would have abandoned the undertaking. But his perseverance triumphed over all difficulties, and in 1712 he declared it his capital, instead of Moscow. At his death the city had only a few good buildings. His successors embellished and almost created it, especially Catharine II. In 1824 it was visited with a terrible inundation. The city formed part of the government of St. Petersburg till 1871, when it was made a separate administrative district.

SAINT PIERRE, a fortified seaport of the island of Martinique, on the N. W. coast; pop. about 30,000. It was settled by the French in 1635, is the largest town in the French West Indies, and is well built. There is an old Catholic college and a botanic garden. The harbor is much exposed. A railway to Fort Royal or Fort de France, the capital, was in progress of construction in 1875.

SAINT PIERRE AND MIQUELON, a French colony, comprising the islands of St. Pierre and Great and Little Miquelon, off the S. coast of Newfoundland, and opposite the gulf of St. Lawrence; area, 81 sq. m.; permanent pop. in 1870, 4,750. It is of importance as a fishing rendezvous. The imports in 1870 were valued at 17,800,000 fr., the exports at 17,700,000 fr. The movement of shipping comprised 1,549 entrances and 1,539 clearances. Capital, St. Pierre; pop. 800. (See FISHERIES, vol. vii., p. 225.)

SAINT-PIERRE, Charles Irénée Castel, abbé de, a French philanthropist, born near Barfleur, Normandy, Feb. 18, 1658, died in Paris, April 29, 1743. He was educated by the Jesuits at Caen and joined the priesthood. In 1686 he went to Paris with the geometrician Varignon, and in 1695 succeeded Bergeret in the academy. In 1702 he became chaplain of the bishop of Orleans, who obtained for him the abbey of Tiron. In 1712 he attended the congress of Utrecht with Cardinal Polignac. His *Projet de paix perpétuelle* (3 vols., Utrecht, 1713-'17) was followed in 1718 by *Discours sur la polysynodie*, in which he severely judged Louis XIV., and advocated constitutional government. He was consequently expelled from the academy, but an association known as *club de l'entresol* gave him opportunities to expound his humanitarian schemes, and became the nucleus of the future academy of moral and political sciences. The club was closed in 1731 by Cardinal Fleury, after seven years' existence. Most of his writings are included in his *Ouvrages de politique et de morale* (18 vols., Rotterdam, 1738-'41).

SAINT-PIERRE, Jacques Henri Bernardin de, a French author, born in Havre, Jan. 19, 1737, died at Éragny-sur-Oise, Jan. 21, 1814. He was educated by a priest at Caen, and went with his uncle to Martinique as a sailor, but resumed his studies at Caen, and subsequently at the college and school of engineers at Rouen. He next served in the army as an engineer, and after various vicissitudes entered the Russian army. He submitted to the empress Catherine II. his scheme for establishing on the shores of the Caspian a republic after the model of that of Plato, which fell to the ground like most of his visionary conceptions. He next joined Radziwill in Poland, and in 1765 was repeatedly under arrest. A love affair with a Polish princess diverted his attention from the political affairs of Poland, and on her deserting him he went to Saxony, determined to have his revenge by fighting against the

Poles; but another romantic adventure drove him from Dresden, and failing to receive employment from Frederick the Great, he returned in November, 1766, to France, whence he sailed as an engineer to Madagascar. On discovering that the real object of the expedition was the slave trade, he left it and remained at the isle of France as an engineer till 1771, when he returned to Paris. Here he associated with Rousseau and other celebrities, and was noted for his eccentricities and love of solitude. In 1792-'3 he was director of the botanical garden; in 1794 he became professor of morals at the normal school, and in 1795 a member of the academy. Under the empire he had a pension of 2,000 francs. By his first wife, Mlle. Didot, he had two children, Paul and Virginia. He married a second time in his 63d year. His principal works are: *Voyage à l'île de France*, &c. (2 vols., Paris, 1773; new ed., 1835); *L'Arcadie* (Angers, 1781; new ed., 2 vols., Paris, 1796); *Études de la nature* (5 vols., Paris, 1784; new ed., 6 vols., 1835-'6; English translation by H. Hunter, 5 vols., 1796); *Paul et Virginie* (1788), his most celebrated work, which has been translated into many languages; *La chaumière indienne* (1790; new ed., including *Le café de Surate*, 1828); and *Harmonies de la nature* (3 vols., 1815; new ed., 4 vols., 1818). Aimé Martin, who married his widow, published his complete works with a biographical notice (12 vols., 1818-'20; new ed., 9 vols., 1835), his posthumous works (2 vols., 1833-'6), and his *Romans, contes et opuscules* (2 vols., 1834).

SAINT-QUENTIN, a town of France, in the department of Aisne, on the Somme, 80 m. N. E. of Paris; pop. in 1872, 34,811. It is well built, the principal streets converging into the Grande Place, which contains the Gothic town hall supported by eight columns. A still more celebrated Gothic building is the cathedral. The town is a great centre of the cotton manufacture, and many other articles are made here, including woollens, machinery, and beet-root sugar. There is a brisk trade in grain, flax, hemp, cattle, &c. The canal of St. Quentin, which connects the basins of the Oise and Somme with that of the Scheldt, upward of 50 m. long, is of great commercial importance. —Under the Romans the town was known as Augusta Vermanduorum. In the middle ages it was the capital of the duchy of Vermandois till 1215, when it was annexed to the crown. The Spaniards captured it in 1557 after a memorable battle (Aug. 10), and two years afterward it was restored to France. During the Franco-German war, Jan. 19, 1871, it was again the scene of a great battle, resulting in the disbandment of the French northern army under Faidherbe.

SAINT SEBASTIAN (Sp. *San Sebastian*), a seaport of Spain, capital of Guipúzcoa, on the bay of Biscay, 39 m. N. N. W. of Pamplona; pop. about 14,000. It occupies a low isthmus uniting Mt. Urgull, on which is the citadel, to

the mainland, and is walled and strongly fortified. The harbor is small. The city contains several churches and convents, civil and military hospitals, and public squares. It was captured by the French in 1719, 1794, and 1808, and by the English with great loss on Aug. 31, 1813, when most of it was burned.

SAINT-SIMON, Claude Henri, count de, a French socialist, born in Paris, Oct. 17, 1760, died there, May 19, 1825. In 1777 he entered the army, and in 1779 went to America, where he distinguished himself at the siege of Yorktown. On his home voyage he was captured by the English with the count de Grasse and detained at Jamaica till the peace of 1783. He then went to Mexico, vainly urging the construction of a Pacific-Atlantic canal, and in 1785 to Spain, where he was not more successful in his scheme for converting Madrid into a seaport. On the outbreak of the revolution he and M. de Redern bought real estate at very low rates. The latter, being the principal, gained by the speculation, while Saint-Simon, after his release from 11 months' imprisonment during the reign of terror, was said to have made only 150,000 francs. In 1801 he married Mlle. de Champgrand, from whom, in the vain hope of becoming the husband of the widowed Mme. de Staël, he was divorced in July, 1802. In 1807 he published his celebrated *Introduction aux travaux scientifiques du dix-neuvième siècle*, in which he expounded the basis of his theories for the reorganization of science and the reconstruction of society. Regarding the great *Encyclopédie* as merely a dictionary, he published in 1810 his *Prospectus d'une nouvelle Encyclopédie*; but Napoleon, to whom he had appealed, took no notice of him, and he was reduced to the most abject poverty. His friend Diard, who had often aided him, died in 1810; subsequently his relatives secured him a small pension. In conjunction with Augustin Thierry, his most devoted disciple, he published *De la réorganisation de la société européenne* (1814), and *Opinions sur les mesures à prendre contre la coalition de 1815* (1815). In *L'Industrie, ou Discussions politiques, morales et philosophiques* (4 vols., 1817-'18), Thierry, Saint-Aubin, and others assisted him. In 1819 he was indicted for asserting in a pamphlet (*Parabole*) that the death of men of science, artists, and artisans was a greater national calamity than that of kings and bishops and other people of mere rank and wealth. He was acquitted in March, 1820, and continued thereafter to devote all his means to defray the cost of publishing his writings. At length in March, 1823, he was driven to despair by the exhaustion of his resources, and shot himself; but the shot only destroyed one eye, and he survived to finish his *Catéchisme industriel* (1824) and his *Nouveau Christianisme* (1825), the crowning work of his life.—For his socialistic doctrines, which became known as St. Simonism, see SOCIALISM. See also *Saint-Simon, sa vie*

et ses travaux, by Hubbart (Paris, 1857). Enfantin published some of his posthumous writings, which are also included in *Œuvres choisies de Saint-Simon* (3 vols., Brussels, 1859; new ed., Paris, 1861). Of the complete edition proposed by Rodrigues, only two volumes appeared in 1832; but the members of the council appointed by Enfantin as the literary executors of Saint-Simon prepared a complete and joint edition of both Saint-Simon and Enfantin's works (20 vols., 1865-'9).

SAINT-SIMON, Louis de Rouvroy, duke de, a French writer of memoirs, born Jan. 16, 1675, died in Paris, March 2, 1755. Under the direction of his mother, Charlotte de l'Aubespine, he became proficient in Latin, German, and history. He served at the siege of Namur in 1691, and subsequently distinguished himself in various campaigns. In 1695 he married Gabrielle de Durfort, daughter of the marshal de Lorges. In 1702, failing to be promoted, he retired from the army. He was prominent at the French court, and was a strenuous opponent of the Jesuits. In 1704 he proposed to end the Spanish war of succession by giving the Spanish Low Countries to Austria and a portion of the Spanish possessions in Italy to a prince of the house of Savoy with the title of king; and his suggestion was to some extent adopted as a basis for the treaty of peace of Utrecht. After the death of Louis XIV. (1715) he aided the duke of Orleans in obtaining the regency, and was a member of the council. In 1721 he negotiated at Madrid the marriage between the infanta of Spain and Louis XV. On his return to Paris he found the cardinal Dubois, whom he had always opposed, more powerful than ever, and the legitimated bastards of Louis XIV. partly re-invested with royal dignities. Consequently he broke off his relations with the government until after the death of Dubois, shortly before that of the regent, upon which he retired to his estates. His *Mémoires*, which subsequently attained unusual celebrity on account of their boldness of expression and pungent satire, were removed to the public archives, and only Voltaire, Marmontel, Mme. du Deffand, and a few others were permitted to read them. Garbled extracts and editions were published in 1788 and 1791; the first authentic and complete series appeared in 1829-'30, and a greatly improved edition was published by Cheruel (20 vols., 1856-'9; abridged English translation by Bayle St. John, 4 vols., London, 1857; new ed., 3 vols., 1875). Among his posthumous papers were found hundreds of letters of the duke of Orleans, unpublished essays of Montaigne, and other valuable manuscripts, of which a full catalogue was obtained from the public archives by Armand Baschet, who published in 1874 *Le duc de Saint-Simon, son cabinet et l'histoire de ses manuscrits*.

SAINT STEPHEN, a town and port of entry of Charlotte co., New Brunswick, on the St. Croix river, opposite Calais, Me., and at the

terminus of a branch of the New Brunswick and Canada railway, 70 m. S. W. of Fredericton; pop. in 1871, 6,515. It is connected with Calais by bridges, and is lighted with gas from that town. The lumber trade and the fisheries are the chief industries. There are two banks, two weekly newspapers, and six churches. The value of imports for the year ending June 30, 1874, was \$261,289; of exports, \$101,818.

SAINT TAMMANY, a S. E. parish of Louisiana, lying on Lake Pontchartrain, bounded E. by Pearl river and drained by its tributaries; area, about 1,200 sq. m.; pop. in 1870, 5,586, of whom 2,175 were colored. The surface is uneven, partly pine barrens, and the soil not very fertile. The New Orleans, Mobile, and Texas railroad touches the S. E. corner. The chief productions in 1870 were 8,795 bushels of Indian corn, 13,266 of sweet potatoes, 26,225 lbs. of rice, 3,186 of wool, 34 bales of cotton, 36 hogsheads of sugar, and 660 gallons of molasses. There were 192 horses, 918 milch cows, 2,109 other cattle, 1,499 sheep, and 2,289 swine; 10 manufactories of brick, 8 ship yards, and 6 saw mills. Capital, Covington.

SAINT THOMAS, an island of the West Indies, in the Virgin group, 30 m. E. of Porto Rico, belonging to Denmark; area, about 35 sq. m.; pop. in 1870, 14,007, one tenth white, two thirds black, and the remainder mixed. The island is formed by a mountain ridge extending the whole length and attaining an elevation of 1,480 ft. The shores are deeply indented, and the adjacent waters are studded with islets and rocks. The climate is warm, the thermometer ranging from 70° to 90° F. Hurricanes pass over the island about once in 20 years, and do great damage. Earthquakes are very frequent, but serious shocks do not occur oftener than once in 50 years. There is no running stream, and only one small spring; rain water is collected, and droughts are frequent. The soil is not fertile, and the products of the island are insufficient for one twentieth of its inhabitants. In 1873 there were 571 deaths, the chief cause of which, among resident adults, was consumption. Charlotte Amalie, the only town, contains 11,380 inhabitants, and is built along the shore of an excellent bay on the S. side, in lat. 18° 20' N., lon. 64° 56' W. It is a free port. The streets are paved and generally clean; the houses are supplied with gas, and, although low and poorly built, are comfortable and healthy. The average annual value of imports is \$5,000,000, besides coal. Eight regular steam lines touch here, the total steam tonnage averaging 600,000 tons per annum, and the total entries of all classes of vessels 4,300 per annum. Negotiations for the transfer of the island to the United States having been commenced, a vote was taken in 1867, which resulted in 1,244 for and 22 against; but the project fell through in the United States senate.

SAINT THOMAS, an island of the gulf of Guinea, belonging to Portugal, in lat. 0° 20' N., lon. 6° 40' E.; area, 145 sq. m.; pop. about

20,000, mostly blacks. In its centre the peak of St. Anna rises to the height of 7,020 ft. The valleys are fertile. The climate of the lowlands is unhealthy, but the southern part is salubrious. Cotton, sugar, indigo, coconuts, cannella bark, sweet potatoes, manioc, dates, and maize are produced. The principal article of export is coffee. A Portuguese bishop resides at the capital, St. Thomas, which has about 4,000 inhabitants. The island was discovered on St. Thomas's day, 1471, by Vasconcellos.

SAINT THOMAS, Christians of. See **CHRISTIANS OF ST. THOMAS**.

SAINT VINCENT, an island of the British West Indies, in the Windward group, about 25 m. S. of St. Lucia; area, 131 sq. m.; pop. in 1871, 35,688, comprising 32,000 colored and 430 aborigines. The surface is divided in the middle by a ridge, culminating in the volcano Morne Garou, about 5,000 ft. high, which contains a crater half a mile in diameter and 500 ft. deep; the most recent eruption was on April 30, 1812. The soil is fertile; the mountains are clothed with valuable forests; the valleys are well watered and cultivated, yielding sugar cane, arrowroot, cotton, and cacao. The average annual value of exports is \$1,206,000; imports, \$760,000. The climate of the low lands is warm but healthful; the mountainous districts are cool. The chief town, Kingston, is on the shore of a fine bay on the S. W. coast.—St. Vincent was discovered by Columbus, Jan. 22, 1498, was first settled by African slaves shipwrecked on the island in 1675, and was subsequently taken possession of by the French, who in 1763 ceded it to Great Britain.

SAINT VINCENT, Cape. See **CAPE ST. VINCENT**.

SAINT VINCENT, Earl of. See **JERVIS**, Sir JOHN.

SAINT VITUS'S DANCE, or *Chorea*, a disorder of innervation, characterized by an irregular action of the voluntary muscles, occurring usually in young persons from the age of 10 to 20 years, and more frequently in females. Its approach is heralded by languor and lassitude, slight dragging of one of the limbs, a furred tongue, general disorder of the stomach and bowels, occasionally pain in the occipital portion of the head, frequently a sense of awkwardness leading the patient to avoid the presence of strangers, and sudden muscular contortions, apparently involuntary. Gradually the muscles cease to be under the full control of the will; the head shakes upon the occurrence of the slightest excitement, and the patient cannot control its motion except by a violent and painful exercise of volition. If he attempts to carry food or drink to his mouth, the hand approaches part way and then moves off suddenly in another direction. The hands and feet will not keep still; the face is distorted by the spasmodic action of the muscles; the motions of the body in walking are very uncertain, and one leg and the opposite

arm will seem paralyzed. The articulation is impeded and painful, the temper variable, and the patient exceedingly sensitive. Occasionally the action is more violent. If watched or noticed, the spasmodic action is invariably aggravated. The most frequent predisposing causes are the changes which take place at puberty. Among the exciting causes are fright, irritation of the stomach and bowels, improper diet, and disordered menstruation.—Chorea is not usually dangerous or even obstinate, although cases have been known in which the involuntary movements were so violent and continuous as to exhaust the strength of the patient and produce death. As a general rule it is simply a manifestation of functional disturbance of the nervous system, dependent on the changes of approaching puberty; and it usually disappears spontaneously after a few weeks or months, when these changes have become fully established. The most effective treatment is hygienic: exercise in the open air, a healthy mental and bodily occupation, simple and nutritious food, the shower bath, and in some cases tonic medicines.

SAKI. See **MONKEY.**

SALA, George Augustus Henry, an English author, born in London in 1828. He is the son of an Italian gentleman and an English singer of West Indian extraction. He was educated for an artist, but became a literary contributor to "Household Words," the "Welcome Guest," "Illustrated London News," and "Cornhill Magazine." In 1860 he established "Temple Bar," a monthly magazine, and was its editor. In 1863 he was the correspondent in the United States of the London "Telegraph," and he has written for that journal from Algeria in 1864, from the Paris exposition in 1867, from the field of war in France in 1870, from Rome in the autumn of that year, and from Madrid, Venice, Algeria, and Morocco in 1875. He has published "A Journey due North, being Notes of a Residence in Russia in the Summer of 1856" (London, 1858); "Twice round the Clock, or the Hours of the Day and Night in London" (1859); "Seven Sons of Mammon" (1861); "Strange Adventures of Captain Dangerous" (1863); "My Diary in America in the Midst of War" (1865); "From Waterloo to the Peninsula" (1866); "Notes and Sketches of the Paris Exposition" (1867); "Rome and Venice" (1869); "Under the Sun: Essays mainly written in Hot Countries" (1872); and "Cookery in its Historical Aspects" (1875).

SALADIN (**MALEK AL-NASIR SALAH ED-DIN ABU MODHAFFER YUSUF**), sultan of Egypt and Syria, born in the castle of Tekrit on the Tigris in 1137, died in Damascus, March 4, 1193. He was the son of Ayub, a Kurd in the service of the famous Noureddin, sovereign of Syria, and in 1163 accompanied his uncle Shirkuh to Egypt as an officer in the army destined to reinstate the emir Shawer, and ultimately to reduce the country to the sway of Noureddin. During three campaigns he dis-

played great military capacity. In 1168 Shirkuh, having reduced the country, became Noureddin's lieutenant, and on his death in the same year his authority devolved upon Saladin, who paid nominal deference to Noureddin, but strengthened his own power. The death of Noureddin in 1173 or 1174 left him absolute master of Egypt, with abundant resources; and taking advantage of the disturbances which convulsed Syria, he invaded that country under pretence of delivering the youthful heir of Noureddin from the unjust tutelage of the regent Shems ed-Din. The latter was defeated in several great battles, and within four years Saladin made himself master of southern Syria and a considerable portion of Mesopotamia. After devoting several years to the affairs of Egypt, he completed in 1182-'4 the conquest of Syria; his brother subdued the richest portions of Arabia, and by 1185 his empire extended from Tripoli in Africa to the Tigris, and from Yemen on the Arabian sea to the Taurus, the Latin kingdom of Jerusalem being alone independent of him. The violation by Reginald de Châtillon of a truce concluded in 1185 between the Latins and Saladin, afforded the latter a pretext for invading the Holy Land with an army of 80,000. The Christian army was overthrown at the famous battle of Tibérias (July 4, 1187), with a loss of 30,000 men. Guy de Lusignan, king of Jerusalem, captured by Saladin, was treated with courtesy; but Reginald de Châtillon, his fellow captive, was decapitated, and the captured knights templars and hospitaliers were massacred. Acre, Ascalon, and other important towns were speedily subdued, and on Oct. 2, 1187, Jerusalem surrendered to him after a siege of two weeks. The inhabitants were offered their freedom at a moderate ransom, several thousand of the poorer classes being exempted from payment, and many being aided by the alms of the conqueror. Tyre, reinforced by Conrad of Montferrat, held out against him, and Saladin, after an unsuccessful siege, made a disgraceful retreat to Damascus. The third crusade (1189) aroused him to the defence of his new possessions, and for two years (1189-'91) he thwarted every attempt of the crusaders to retake Acre. When the city finally capitulated to Richard Cœur de Lion and Philip Augustus, the former, left by the departure of the French king sole commander of the Christian hosts, led the crusaders down the coast to Ascalon, his march of 100 miles being, as Gibbon says, "a great and perpetual battle of eleven days." At the battle of Arsuf, fought on St. George's day, in which the Moslems were routed, Saladin, seeing Richard fighting on foot, is said to have sent him his own horse as a present. Ascalon having fallen, the crusaders in the spring of 1192 advanced within a day's march of Jerusalem, but were induced by dissensions in their own ranks to retreat when the city seemed fairly within their grasp.

Tedious negotiations followed, but on Sept. 2 a three years' truce was concluded. The incessant toils of the last few years had impaired the health of Saladin, and he died of a bilious fever after an illness of 12 days.

SALADO RIVER. See ARGENTINE REPUBLIC, vol. i., p. 688.

SALAMANCA. I. A W. province of Spain, in Leon, bordering on Portugal and the provinces of Zamora, Valladolid, Ávila, and Cáceres; area, 4,940 sq. m.; pop. in 1870 estimated at 280,870. It is hilly in the north and mountainous in the south. The chief rivers are the Tormes, Yeltes, and Agueda, tributaries of the Douro, which forms part of the N. W. boundary line, and the Alagon, an affluent of the Tagus. Gold occurs in the Agueda and the Alagon; iron, copper, and lead are found, but few mines are now in operation; rock crystal and saltpetre are abundant; and there are numerous thermal springs. The soil is very fertile, and grain and fruits are plentiful; but much the larger part of the country is divided between forest and pasturage, and many animals are reared. The wines and oils of Salamanca are justly esteemed; but the once flourishing manufactures of carpets, laces, and leathers have become insignificant. Besides the capital, the chief towns are Ciudad Rodrigo, Bejar, Peñaranda, and Alba de Tormes. II. A city (anc. *Salmantica*), capital of the province, built on three hills, on the right bank of the Tormes, 110 m. W. N. W. of Madrid; pop. about 17,700. It is surrounded by ancient walls, and presents from without a quaint and picturesque appearance. The streets generally are very irregular; but the numerous public squares are fine and spacious, especially the Plaza Mayor, one of the largest in the kingdom. This square is flanked on every side by a magnificent colonnaded arcade, the lower portion of which is for the most part occupied by shops. On the N. side is the city hall; and the façades of the S. and W. sides are embellished with busts of sovereigns and great men of Spain. As many as 20,000 spectators commonly attended the bull fights of which this square was the scene as late as 1863. The number and beauty of its public edifices have gained for Salamanca the appellation of *Roma la Chica* (little Rome). Foremost among them is the cathedral, in the florid Gothic style, begun in 1513, after a plan of Juan Gil de Otañon, and consecrated in 1560. Near it is the old cathedral, a massive structure of Norman-French architecture, founded in 1102 by Gerónimo, the confessor of the Cid. The bridge over the Tormes, with 27 arches, was partly built by the Romans, and finished under Philip IV. The university, founded about 1200, was one of the most celebrated in Europe, having sometimes upward of 10,000 students; but it is now almost deserted. The chief libraries are those of the university and of the college of San Bartolomé. Woollens, leather, hats, and earthenware are manufac-

tured.—Salamanca was an ancient city of the Vettones. It was taken by Hannibal in 222 B. C. Under the Romans it was made a military station, and the remains of a road made by them and some monuments are still extant. It was captured and ravaged by the Moors, who were finally expelled from it in 1095. In the 12th century it was made a bishopric, and several councils were held here in the 14th and 15th. The battle of Salamanca, in which the French, after pillaging many of the public buildings and destroying 13 convents and 20 colleges, were defeated by Wellington, July 22, 1812, took place 4 m. S. E. of the city.

SALAMANDER, the popular name of most of the batrachian reptiles with persistent tail (*urodela*) which lose the gills in the adult condition (caducibranchiates). The family of *amphiumidæ* has been noticed under MENOPOMA. The family *salamandridæ* has been divided into two groups, the aquatic and terrestrial, of which the former will be described under TRITON. Schneider reunited the water and land salamanders into a single genus *salamandra*, comprising the genera *salamandra* and *triton* of Laurenti. Prof. Baird (in the "Journal of the Academy of Natural Sciences," vol. i., Philadelphia, 1850) makes no generic distinction between the aquatic and terrestrial species, though he subdivides *salamandra* into several genera established by Rafinesque, Tschudi, and others. The division into groups according to general habitat will be retained here, and the species now noticed will be those which belong to the old genus *salamandra* (Laurenti). In this group the body is lizard-like, the limbs four, the maxillary and palate bones with minute teeth, the tongue more or less pediculated and free; there is no sternum, the ribs are rudimentary, and the pelvis is suspended by ligaments; there are in the adults neither gills nor gill openings, and the lungs are well developed; the eyes are prominent and furnished with lids; the skin is without scales, and has numerous warty glands which secrete an acrid viscid fluid; the tail is generally cylindrical. They live on land in the adult state, and are found in the water only during the breeding season; they frequent damp places, and are found only in the northern hemisphere, in Europe, and especially in North America. The young, instead of being wholly developed in the water, in some are retained so long within the oviduct that they are born alive, having undergone a portion of their metamorphosis; the young live constantly in the water and breathe by external gills, which disappear with the gill openings when the respiration becomes pulmonary; the anterior limbs are developed earlier than the posterior, the former having four and the latter five toes. From large glands behind the eyes and on the body is secreted a yellow matter so abundantly and rapidly, that it gave rise to the popular belief, once extensively prevalent, that they possess the power of extinguishing and

of remaining unharmed in fire, to test which many have been cruelly destroyed; this acrid secretion seems to be poisonous to some of the lower animals, and has caused their bite and even their touch to be regarded as venomous. They rarely exceed $6\frac{1}{2}$ in. in total length. Some of the tritons are essentially terrestrial in their habits.—Among the North American species may be mentioned, in the genus *pseudotriton* (Tschudi), the red-spotted salamander (*P. ruber*, Tsch.; *S. rubra*, Daudin), 4 to 6 in. long, red above with many small, black points, sides red and abdomen orange red, both unspotted; it is very common under rocks and fallen trees, and preys on insects; it inhabits the Atlantic states from Massachusetts to Florida; it is handsome, and the same as the *S. maculata* (Green). In this species the body is very short, and the tail is equal to or less than the body. The blue-spotted salamander (*S. glutinosa*, Green; *plethodon*, Tsch.) is about 7 in. long, bluish black above, with small white spots on back and tail and larger ones of the same color on the flanks; the tail is nearly twice the length of the body. This is common from Massachusetts to the gulf of Mexico, living in preference under fallen trees; the specific name was derived from the great quantity of glutinous matter suddenly given off from the skin. The red-backed salamander (*S. erythronota*, Green; of the same genus of Tschudi) is about 3 in. long, with a reddish brown band from the snout to the end of the tail, the sides yellowish brown, and abdomen whitish; tail shorter than the body, and separated with great facility by the animal when seized by it, a faculty possessed by many of the family. It is very handsome and common, very agile, found under stones and dead trees with snails (*helix*) from the Lake Superior copper region to Pennsylvania; the eggs are deposited in packets under damp stones. The long-tailed salamander (*S. longicauda*, Green; *spelærpes*, Raf.) is about 6 in. long, of which the tail is more than half; the body is lemon yellow above with numerous small irregular black spots, tail with transverse black bands, and lower parts yellowish white; its habits are more aquatic than in most land salamanders; it is found from northern New York to Kentucky. The symmetrical salamander (*S. symmetrica*, Harlan; *notopthalmus miniatus*, Raf.) is about 4 in. long, brownish red above, with a row of symmetrically arranged deep red spots on each side; lower parts orange with black dots; tail longer than the body and compressed; skin rough. It is found from Maine to Florida; in young specimens the whole back is covered with minute black dots, and the sides have fewer spots. The violet salamander (*S. subviolacea*, Bart.; *amblystoma*, Tsch.) is about 6 in. long, body and tail above bluish black with a row of round or oval yellow spots on each side, the under surface of the same color tinged with purple; it passes most of its time in moist places, and is found

from Maine to South Carolina. In the species belonging to the last two genera of Rafinesque and Tschudi, there are no sphenoidal teeth, and the carpus and tarsus are ossified in the adults, and the tongue rudimentary in the former and large and fleshy in the latter; in the other subgenera sphenoidal teeth are sometimes present, and the tongue is generally protractile. Other genera and several other species of American salamanders are described by Baird in the above mentioned journal, in vol. x. of the Pacific railroad reports, and in vol. ii. of the Mexican boundary survey. They are all not only harmless, offering no resistance when captured, but are positively beneficial from the great numbers of noxious insects and larvæ which they devour.—The common salamander of Europe (*S. maculata*, Merrem) is black with more or less large yellow spots. It is found in central Europe, and in



Common European Salamander (*Salamandra maculata*).

the mountainous parts of S. Europe, in cool and moist places, and feeds on insects, worms, and small mollusks; it attains a length of 7 or 8 in.; it is viviparous, and produces 20 to 30 young at a birth.

SALAMIS (now *Kuluri*), an island of Greece, in the gulf of Ægina, of very irregular form, lying near Attica, from which it is separated by a narrow channel, and 10 m. W. of Athens; greatest length about 10 m., average width about 3 m.; area, about 30 sq. m; pop. 5,000. One small stream flows into the sea on the S. W. coast. The chief modern town is Kuluri, on the W. shore, at the head of the bay of the same name. The island is hilly, and mostly barren, but produces some olives, vines, and cotton. On the E. shore are the ruins of the ancient city of Salamis.—Salamis is said to have been made a kingdom by Telamon, father of Ajax. It continued independent till 620 B. C., when its possession was disputed by Attica and Megaris, and finally it became one of the Attic demi. It was celebrated as the birthplace of Solon and Euripides, but most of all for the great naval victory gained by the Greeks under Themistocles over the fleet of

Xerxes in 480 B. C., about the beginning of autumn. (See GREECE, vol. viii., p. 190.) Several times in modern wars the inhabitants of Attica have been forced to take refuge in Salamis.—Salamis was also the name of an ancient city of Cyprus, on the E. coast, the most important in that island, ruins of which are still visible at Old Famagusta.

SAL AMMONIAC. See AMMONIA.

SALDANHA OLIVEIRA E DAUN, João Carlos, duke of, a Portuguese statesman, born in Lisbon, Nov. 17, 1791, died Nov. 21, 1876. His mother was a daughter of Pombal. He studied at Coimbra, and at an early age was a member of the council for the colonies. In 1810 he was sent to England as a prisoner, and subsequently went to Brazil, where he served in the army and as a diplomatist. Having returned to Portugal, he was appointed minister of foreign affairs in 1825 by John VI., after whose death in 1826 he became governor of Oporto, and under the constitution of Dom Pedro minister of war, till June, 1827, when he resigned and went to England. Dom Miguel having usurped power, Saldanha raised troops against him, but they abandoned him. In 1832 he landed in Portugal with Dom Pedro, and became commandant of Oporto, and subsequently marshal and generalissimo. Aided by the duke of Terceira, he terminated the war by taking the capital, and compelling the capitulation of Dom Miguel at Evora. In 1835 he became minister of war and president of the council; but he resigned in November of the same year and lived abroad from 1836 to 1846, when he was recalled by the queen to form a ministry. In 1849 he was overthrown by Costa-Cabral, who offered him a place in his ministry, which he refused. In 1851 Saldanha effected a new revolution, and was again at the head of the government till the accession of Pedro V. in 1856. He was minister in Rome from 1862 to 1864, and again from 1866 to 1869. In May, 1870, he instigated a revolt in the army, which compelled the king to place him once more at the head of the cabinet; but the new elections went against him, and he was succeeded on Aug. 30 by Sa da Bandeira. At his death he was ambassador to England.

SALE, in law, a contract to give and transfer rights of property for money, which the buyer pays or promises to pay to the seller for the thing bought and sold. The word is often applied indifferently to the transfer, for a consideration, of both real and personal property; but in its proper and technical sense it applies only to that of personal property, the transfer of real property passing under the denomination of a grant or conveyance. The difference between a sale and an exchange is that in the former the price is paid in money, while in the latter it is paid in goods. Three things are necessary to constitute a valid sale at common law, viz.: the thing to be sold, the price to be paid for it, and the agreement or consent of the contracting parties that the property in the

subject matter should pass from the vendor to the vendee, for the stipulated price given or promised to be given by the vendee. If there is no evidence that the sale is on credit, an agreement for immediate payment is implied; and if the vendee leaves without paying, the vendor may rescind the sale and demand and recover his goods. But the actual delivery of a chattel, and the acceptance of earnest or part payment by the seller, is evidence of an implied agreement between them that something is left to be done in future, and the legal presumption of immediate payment is thereby rebutted. The buyer however cannot take the goods, notwithstanding earnest be given, without full payment, unless it is an express condition of the sale. If he does not come, in a reasonable time after request, and pay for and take the goods, the contract may be dissolved by the seller, and he is at liberty to sell the goods to another person. But where express terms are agreed upon whereby the delivery or the payment is postponed to a future time, the sale is complete, and the property in the chattel passes immediately to the buyer. The thing sold must be in actual existence at the time of the sale, otherwise the sale will be invalid. If one man sells to another a horse, and the horse is dead, or if he sells a house or other property which has been destroyed by fire, both parties being ignorant of the fact before sale, it is invalid. If a part only of the subject matter is non-existent or destroyed, and the remainder is capable of transfer or delivery, the buyer has the liberty, at his option, either to rescind or enforce the contract as to such remainder. The price to be paid must be ascertained and certain, or so referred to a definite standard that it may be made certain; and the thing sold must also be specific or capable of a certain identification. When made by letter, the contract is complete as soon as a distinct proposition contained in it is accepted *bona fide*, by letter written within a reasonable time, and mailed before the acceptor receives information of a withdrawal of the offer. If the thing is sold for cash, the vendor is entitled to hold possession of it until he receives his pay. He cannot sue for the price until the goods are delivered or tendered; but if they are accidentally destroyed while thus in his possession, and without any fault or carelessness on his part, he may then sue for the price. If the price is not paid, whether the goods are sold for cash or on credit, and they remain in the hands of the seller, he has a lien on them for the price. This lien is destroyed by either actual or constructive delivery of the goods; and if he takes a bill of exchange or promissory note as security for the price, he also loses his lien. After a sale of personal property and a fair and absolute delivery to the purchaser personally, the seller cannot reclaim or retake possession of the property (upon the ground of a lien), because the consideration which was to have been given at the time of the delivery has not been

paid, even though the purchaser shortly after becomes insolvent; for the seller's lien being once lost or waived by the delivery, it cannot reattach.—A sale without delivery is not valid, in general, against a third person who buys without notice; and if the goods are sold by the vendor to two different and innocent parties, by transfers equally valid, he who first obtains possession of the goods will hold them. But as between the seller and the purchaser, delivery is not necessary to complete the bargain; though as between the seller and his creditors a strong inference arises, in the absence of delivery, that the sale itself is colorable, and intended as a fraud upon the creditors. This inference is not conclusive, but is one of fact to be considered by the jury in connection with other circumstances. Symbolical delivery will in many cases be sufficient and equivalent in its legal effect to actual delivery. The delivery of the key of a warehouse in which the goods sold are deposited; or transferring them in the warehouseman's or wharfinger's books to the name of the buyer; or the delivery of a part as representative or as an instalment of the whole, is a delivery sufficient to transfer the property. When the goods sold are of such a nature or in such a situation that a personal possession of them is impracticable or inconvenient, the simple sale and an agreement of the parties will pass the property to the purchaser without actual delivery. If no particular time is appointed by the terms of the contract for delivery or payment, these must be made within a reasonable time; and the seller is bound to keep the things sold until time of delivery with ordinary care and good faith; otherwise he will be liable should they be injured or destroyed. If the contract is to deliver at the residence of the buyer or any other particular place, and this is not done, the seller is liable even though such a delivery becomes impossible, unless it becomes so through the act or fault of the purchaser. If the goods are to be delivered to the purchaser, but no place of delivery is named, they must be sent to him wherever he may happen to be, or to his house or place of business, unless they were bought to be used for any particular purpose, or at any particular place. When a time and place are expressed in the contract of sale, the buyer must receive and pay for them then and there, and also pay all reasonable charges for keeping after the sale and before delivery. If the goods are sold on credit, and the purchaser should become insolvent before delivery, the seller may demand security and refuse to deliver without.—Whenever, in a contract of sale, it is agreed that some particular act shall be done in relation to the thing sold, by either party, as that the goods shall be delivered on a particular day, or on request, or that a promissory note shall be given, this makes a conditional sale. So it is a condition precedent where some act remains to be done, such as

weighing or measuring; and if there is no evidence tending to show the intention of the parties to make an absolute and complete sale, the property does not pass wholly to the buyer until such condition is performed. If the buyer neglects or refuses to comply with a condition precedent, and the goods are therefore not delivered, the seller may, after due delay and precautions, resell them, and hold the buyer responsible for any deficiency in the price. In all of these cases the property in the thing sold passes to the buyer by the fact of sale, but he holds it subject to the lien or other reserved right of the seller. One class of sales on condition are those known as "contracts of sale or return," where possession of the goods is given to the purchaser with the privilege of keeping them or returning them within a specified time. If he returns them within this time, the contract is rescinded; but otherwise the sale becomes absolute and complete. When goods are sold by auction, the conditions of sale made known to the buyer by the advertisement, or communicated by the auctioneer at the time of sale, bind both parties, and regulate the transfer and possession of the property. When goods which are only a numerical proportion of an entire bulk are sold, no property passes and the sale is incomplete until such part has been separated and set apart from the remainder and actually delivered.—The seller of goods has not only a lien upon them for the price while they remain in his possession, but he may, in the event of the bankruptcy or insolvency of the purchaser, after he has parted with the possession of them, and while they are *in transitu* on their way to the purchaser, retake them, the price being unpaid. (See STOPPAGE IN TRANSITU.) A sale of goods with intent to delay, hinder, or defraud a creditor, though good as between the parties, is utterly void as against the creditor, even if the purchaser pays full value for them, unless the purchaser was ignorant of the fraud and purchased them in good faith, as well as for a good consideration.—Contracts of sale which have an immoral or illegal object in view are void at common law. Contracts with an enemy for the purchase or sale of goods, and contracts in contravention of statutory provisions, are illustrations of this rule. The obtaining goods upon false pretences, under color of purchasing them, does not change the property; but it has been held that a *bona fide* purchaser of goods for a valuable consideration, from a person who obtained them from the owner by false pretences, amounting even to a felony, will hold them against the first seller, if he (the first seller) voluntarily parted with the possession and intended to part with the title. The sale will never be valid in favor of the purchaser where he obtains the goods by fraud practised upon the seller under color of a purchase, whether on credit or otherwise. Thus, if an infant fraudulently represents him-

self to be of full age, and by such false representation succeeds in obtaining goods on credit, the sale will be void, and the seller may reclaim the goods from the buyer, or from any one who has not bought the goods of the buyer for value, and in ignorance of the fraud. If a person steals goods and sells them, the property is not thereby changed, but remains in the rightful owner, who may reclaim them wherever they may be found. In England there is an exception to this rule, which is where the goods are sold by the wrongful possessor in market overt, in which case the sale is binding upon the true owner, and the purchaser obtains a good title. But in this country no sale of goods by the wrongful possessor is valid. (For sale with warranty, see WARRANTY.) A conjectural estimate of the value is not a misrepresentation which might avoid the sale; and concealment, to be fraudulent and material, must be a concealment of something which the party was bound to disclose. A seller is unquestionably liable to an action for deceit if he fraudulently represents the quality of the thing sold to be other than it is, in some particulars which the buyer has not equal means with himself of knowing; and he is if he do so in such a manner as to induce the purchaser to abstain from making the inquiries which for his own security and advantage he would otherwise have made.

SALE, Salee, or Sla, a walled town of Morocco, on the Atlantic coast, in lat. $34^{\circ} 4' N.$, lon. $6^{\circ} 45' W.$, at the mouth of the river Bu Regreg, on its N. bank, opposite Rabat; pop. about 10,000, chiefly descended from Spanish Mohammedans. One half the area enclosed by the walls is now unoccupied. Carpets and combs of lentisk wood are manufactured; the exports consist principally of wool. The harbor will admit only brigs and schooners. Salé was a resort of pirates in the latter part of the 18th century, when it was substantially independent of Morocco. In 1851 it was bombarded and nearly destroyed by the French.

SALE, George, an English oriental scholar, born in Kent in 1680, died in London, Nov. 14, 1736. He was educated at King's school, Canterbury, and was a lawyer. For the "Universal History," edited by Swinton and others, he wrote the cosmogony and parts of oriental history. He was also one of the authors of the "General Dictionary" (10 vols. fol., London, 1734), and he translated the Koran into English from the original Arabic, with notes and comments. His translation was defective, but many editions have been published. After his death his Arabic, Persian, and Turkish manuscripts were purchased for the Radcliffe library at Oxford.

SALEM, a S. W. county of New Jersey, bordered W. by the Delaware river, drained by Salem, Alloway's, and other creeks, and traversed by several railroads; area, 540 sq. m.; pop. in 1870, 23,940. The surface is level and the soil a fertile sandy loam. Marl abounds,

and iron ore is found. The chief productions in 1870 were 259,777 bushels of wheat, 756,342 of Indian corn, 164,678 of oats, 350,955 of Irish and 220,574 of sweet potatoes, 67,496 of grass seed, 39,454 tons of hay, 11,658 lbs. of wool, and 373,849 of butter. There were 5,155 horses, 630 mules and asses, 7,352 milch cows, 9,946 other cattle, 6,668 sheep, and 9,836 swine; 5 manufactories of carriages and wagons, 3 of window glass, 4 of machinery, 2 of paper, 10 of saddlery and harness, 3 foundries, 5 brick yards, 4 tanneries, 14 flour mills, and 19 saw mills. Capital, Salem.

SALEM, a city, port of entry, and one of the shire towns of Essex co., Massachusetts, occupying a peninsula between two arms of the sea, called North and South rivers, and adjacent territory, 14 m. N. by E. of Boston; lat. $42^{\circ} 31' 18'' N.$, lon. $70^{\circ} 53' 53'' W.$; pop. in 1870, 24,117, of whom 6,084 were foreigners; in 1875, 26,068. The peninsula is about 2 m. long and $\frac{3}{4}$ m. broad. A small peninsula called the Neck is attached to it, and was first inhabited; a large portion of it belongs to the city, and is occupied as the almshouse farm. The site of that part of the city within the peninsula is flat, but healthy; in other parts the surface is more uneven. The streets are irregular, but well built. In the E. part of the city, toward the end of the peninsula, is a beautiful park or "common" of $8\frac{1}{2}$ acres, called Washington square. Harmony Grove cemetery, on the W. border, contains 65 acres. Salem is connected with Lowell by the Salem and Lowell railroad, and with Boston by the Eastern railroad, and there are branches to Marblehead and Lawrence. Horse cars run through the principal streets and to the adjoining towns.—Salem was formerly noted for its foreign commerce. In its very infancy its inhabitants not only engaged in the fisheries and the coasting trade, but in vessels of 40 to 60 tons traded with Spain, Italy, France, and the islands of the West Indies. In the revolutionary war 158 privateers, mounting at least 2,000 guns, and carrying not fewer than 6,000 men, were fitted out from the town of Salem. These vessels captured 445 prizes, and brought nine tenths of them into port in safety. In 1785 the first vessel ever sent from this country to the isle of France, Calcutta, and China, was despatched by Elias Haskett Derby of Salem; and for years Salem held almost the monopoly of that trade, and in 1818 had 54 vessels engaged in it. The trade to the other ports of the East Indies and Japan was also commenced by the merchants of Salem, as was that to Madagascar and Zanzibar, and the other gum and ivory ports of E. Africa, the legitimate trade to the ports of W. Africa, the commerce with Brazil and the Amazon, and especially the India-rubber trade, in which for many years she took the lead. The foreign commerce of Salem is now small, but the coasting trade is large and increasing, coal for shipment to the interior

manufacturing towns being the chief item. Recently the fisheries, which ceased as the East India trade grew up, have been resumed. The value of imports from foreign countries into the customs district, which includes also Beverly and Danvers, for the year ending June 30, 1874, was \$60,717; of exports to foreign countries, \$50,153; number of entrances, 84, tonnage 8,468; clearances, 100, tonnage 11,767; number of vessels belonging in the district on that date, 91, tonnage 9,409; engaged in the cod and mackerel fisheries, 55, tonnage 3,386. The number of entrances in the coastwise trade during the same year was 98, tonnage 10,443; clearances, 41, tonnage 5,461.—Manufacturing is a prominent interest, and is increasing. The manufacture of leather is the most important branch. Other articles are jute bagging, cordage, twine, machinery, foundry products, cars, chemicals, boots and shoes, white lead, leather belting, lead pipe and sheet lead, trunks and valises, furniture, and glue. The car shops of the Eastern railroad company are here. The Naumkeag steam cotton company has two large mills, with 1,438 looms and 73,594 spindles, and employs a capital of \$1,200,000. There are seven national banks, with an aggregate capital of \$2,015,000; two savings banks, with about \$3,000,000 deposits; and five insurance companies.—Salem is divided into six wards, and is governed by a mayor with a board of six aldermen and a common council of four members from each ward. It has an efficient police force and a good fire department. The streets are lighted with gas, and water is supplied by an aqueduct from Wenham lake, 4 m. distant. The assessed value of property in 1874 was \$25,845,675 50, viz.: real estate, \$14,121,000; personal estate, \$11,724,675 50. The taxation on property amounted to \$438,995 65, of which \$32,380 was for state purposes, and \$22,243 30 for county purposes. The net expenditures for the eleven months ending Dec. 1, 1874, were \$279,680 29; city debt, less cash assets on that date, \$1,358,753 07. Besides the almshouse and smallpox hospital, there are an orphan asylum, a dispensary, a reform school for boys, and several charitable societies. The public schools are under the general management of a school committee of 20 members, who appoint a superintendent. There are a high school, five grammar and twelve primary schools, two evening schools, two drawing schools, and a special school for factory operatives and others unable to pursue the regular course. The number of pupils enrolled in the public day schools in 1874 was 4,206; average attendance, 2,953; number of teachers, 80. The total expenditure for schools was \$71,180 55. One of the state normal schools (for females) is here. Among the principal public institutions is the East India marine society, organized in 1799, and formed of those who, as captains or supercargoes, have doubled Cape

Horn or the cape of Good Hope. The museum of this society is one of the most interesting and valuable in the country. Together with the scientific collections of the Essex institute, it has been placed in charge of the trustees of the Peabody academy of science, founded by George Peabody in 1869 by the gift of \$150,000. The joint collections, with those of the academy, are deposited in the East India marine hall, and are accessible to the public. The Essex institute, organized in 1848 by the union of the Essex historical society and the Essex county natural history society, besides its extensive cabinet of natural history, has a library of 30,000 volumes, a large collection of portraits, and many historical and other relics. The Salem Athenæum, formed in 1810 by the purchase of the social and philosophical libraries as a basis, has a library of 15,500 volumes. These two last named institutions occupy the fine building known as Plummer hall, erected in 1856 from funds bequeathed to the Salem Athenæum by Miss Caroline Plummer. In the same building are the libraries, each comprising about 1,000 volumes, of the Essex agricultural society, incorporated in 1818, and the Essex southern district medical society, formed in 1805. The office of the permanent secretary of the American association for the advancement of science, organized in 1848, is in the East India marine hall, and contains a small and select scientific library. The charitable mechanical association, organized in 1817, has a library of 4,000 volumes. Other important associations are the marine society, instituted in 1766; the lyceum, in 1830; the young men's union, in 1855; and the young men's Christian association, in 1858. Two semi-weekly and three weekly newspapers and two monthly periodicals are published. The number of churches is 20, viz.: 3 Baptist, 3 Congregational, 2 Episcopal, 1 Free Advent, 1 Friends', 2 Methodist, 1 New Jerusalem, 2 Roman Catholic, 4 Unitarian, and 1 Universalist.—Salem is the oldest town in Massachusetts except Plymouth, having been settled in 1628 by John Endicott, before whose arrival, however, a house had been built there by Roger Conant in 1626. In 1629 11 ships arrived here from England, bringing 406 immigrants, who settled in various localities in the vicinity. The first church organization effected in this country was at Salem in 1629, with the Rev. Francis Higginson as its pastor. In 1692 the famous witchcraft delusion made its appearance, and 19 persons from this and adjacent towns were executed on the eminence now known as Gallows hill. It had its origin in what is now the town of Danvers, and the persons connected with it belonged to several other towns also. (See WITCH.) The town was incorporated in 1630, and received city privileges in 1836. Its Indian name was Naumkeag.

SALEM, a city and the county seat of Salem co., New Jersey, on a creek of the same name, 3 m. from its mouth in the Delaware river,

32 m. in a direct line and 44 m. by rail S. S. W. of Philadelphia; pop. in 1850, 3,052; in 1860, 3,865; in 1870, 4,555; in 1875, 4,459. The creek is navigable to this point by vessels of 50 tons. There is regular communication with Philadelphia by steamer and by the West Jersey railroad. The city owes its prosperity chiefly to the rich agricultural resources of the surrounding country. It contains manufactories of glassware for druggists' use, oil cloth, carriages, &c., fruit-canning establishments, ship yards, a national bank, two building associations, seven public and six private schools, two weekly newspapers, and eleven churches.

SALEM, a town and the county seat of Roanoke co., Virginia, on the Roanoke river and the Atlantic, Mississippi, and Ohio railroad, 145 m. W. by S. of Richmond; pop. in 1870, 1,355, of whom 500 were colored; in 1875, about 2,000. It is at the head of the valley of Virginia, between the Blue Ridge and Alleghany mountains, and is celebrated for its healthfulness, mild climate, and fine scenery. It is a favorite summer resort. In the immediate vicinity are sulphur and chalybeate springs, and within a radius of 30 m. are seven of the most celebrated mineral springs in Virginia. The Valley railroad, in course of construction, is to terminate here. The town has several hotels, a national bank, two free schools (white and colored), two weekly newspapers, and Baptist, Episcopal, Lutheran, Methodist, and Presbyterian churches. It is the seat of Roanoke college, Lutheran, founded in 1853, which has beautiful grounds and three fine brick buildings. There are collegiate, normal, and preparatory departments; and select courses may be pursued. The library contains about 13,000 volumes. The college has extensive chemical and philosophical apparatus and a large cabinet of minerals. In 1874-'5 it had 9 instructors and 167 students (84 collegiate, 40 select and normal, and 43 preparatory). The number of alumni in 1875 was 133. The theological seminary of the Evangelical Lutheran church, founded at Lexington, S. C., in 1830, was removed to Salem in 1873.

SALEM, a city and the county seat of Marion co., Oregon, capital of the state, beautifully situated on the E. bank of the Willamette river, and on the Oregon and California railroad, 50 m. S. of Portland; pop. in 1870, 1,139; in 1875, about 6,000. The river is navigable to this point during three fourths of the year, and steamers run regularly to Portland. The city is surrounded by a fertile prairie. Mill creek enters the river at this point, and its rapid fall affords good water power. There are flouring mills, tanneries, machine shops, foundries, a woollen mill, a linseed oil mill, and other manufactories. The city has two private banks, one daily and three weekly newspapers, and eight churches. It is the seat of Willamette university and of three state institutions, the penitentiary, deaf-mute school, and institute for the blind. It was settled in 1834, incor-

porated in 1853, and became the state capital in 1860.

SALEM, a district of British India, in the province of Madras, bordering on Mysore, North and South Arcot, Trichinopoly, and Coimbatore; area, 7,617 sq. m.; pop. in 1871, 1,963,243. It includes the high table land of Barramah, which produces teak, sandal, and rose wood, and cedar in great abundance. The principal river is the Cavery. Artificial sheets of water or tanks for irrigation are numerous. Iron ore is abundant, and mines of chromate of iron have been extensively worked at the foot of the Sheevaroy hills. The district is the principal seat of the Indian steel manufacture. Cotton, tobacco, indigo, coffee, and rice are extensively cultivated. The capital is Salem, 170 m. S. W. of Madras; pop. about 25,000. Silk and cotton are manufactured here.

SALEP (Persian, *sahaleb*), a substance consisting of the dried bulbs of various species of *orchis*, and other plants of the same family. Any of the tuberous-rooted orchids afford it, and it is ascribed to more than a dozen species, natives of different countries from England to India. It is known in commerce by the country rather than by the plant producing it; it is chiefly supplied through Smyrna. Some species have roundish and others lobed tubers, which when taken up are stripped of their epidermis and plunged in boiling water or dried in an oven, after which they are strung together in bunches. In drying they form small, oval, irregular masses, hard, horny, semi-transparent, of a yellowish color, feeble



Orchis mascula, one of the plants furnishing Salep.

odor, and mild mucilaginous taste. It is used in a powdered state, in which it is also sometimes kept. Salep has long been in use in oriental countries, where it has for ages been regarded as able to restore virility; but at best it is only an article of diet of no special value.

It contains a small proportion of starch, and 48 per cent. of a peculiar mucilage more nearly allied to cellulose than to gum; it will convert 40 parts of water into a thick jelly; small amounts of sugar and albumen are also present. Salep is hardly known to Americans; druggists keep it to supply the wants of Europeans, who use it in a decoction flavored with spice, wine, and sugar.

SALERNO (anc. *Salernum*), a town of S. Italy, capital of the province of Principato Citeriore or Salerno (see *PRINCIPATO CITERIORE*), at the head of the gulf of Salerno in the Mediterranean, 30 m. S. E. of Naples; pop. in 1872, 27,759. The port, long nearly filled up with sand, has been improved since 1868. The cathedral, begun about 1080 on the site of an older edifice, contains the remains of Pope Gregory VII., and according to tradition also those of St. Matthew, to whom it is dedicated. The university of Salerno, especially celebrated in the middle ages for its school of medicine, was replaced in 1817 by a lyceum.—*Salernum* was originally founded by the Greeks or Tyrhenians, and received a Roman colony in 194 B. C. It was some time the residence of the Lombard duke of Benevento, in 840 became an independent principality, in 1077 was captured by Robert Guiscard and made the capital of the duchy of Apulia, and afterward passed to the kingdom of Naples.

SALES, Francis de. See *FRANCIS DE SALES*.

SALFORD. See *MANCHESTER*.

SALIANS, or Salic Franks, a tribe of Germans, who in the 5th century invaded Gaul, and by its conquest under Clovis founded the French monarchy. (See *FRANKS*.) Their code of law was called the *Salic*. (See *CODE*, vol. v., p. 7.)—*Salic land* (*terra Salica* or *dominicata*) was a name given to an estate subject to no burden, depending upon no superior, and upon which the manor house of the master was situated. Later the title was applied also to inherited landed property as distinct from acquired possessions, and by the *Salic law* females were excluded from inheriting this species of property. This last feature of their law has always prevailed in France with respect to the crown, as it did in Spain under the Bourbon line till 1830, when it was abolished in favor of Isabella. The German emperors of the house of Franconia, from Conrad II. to Henry V. (1024–1125), are designated as *Salians*.

SALICINE, a crystallizable bitter substance contained in the leaves and young bark of the willow (*salix*), poplar, and several other trees, discovered by Leroux in 1830. It was investigated by Piria, who discovered many of its derivatives, among them salicylic acid. It is prepared by boiling the bark in water, concentrating the decoction, digesting with oxide of lead, and precipitating the lead by sulphuretted hydrogen, when salicine crystallizes out on evaporating and cooling. By treatment with animal charcoal and recrystallizing it may be obtained pure in small white silky needles,

having an intensely bitter taste, but no alkaline reaction. Its formula is $C_{13}H_{10}O_7$. It is soluble in 5–6 parts of cold, and in much less boiling water. The addition of sulphuric acid produces a deep red color. Distilled with a mixture of bichromate of potash and sulphuric acid, among other products there is a yellow, sweet-scented oil, called salicylöl, $C_7H_6O_3$, identical with the volatile oil which was obtained from the flowers of *spiræa ulmaria* or common meadow-sweet by Löwig and Weidmann.

SALIC LAW. See *SALIANS*.

SALICYLATE OF SODIUM. See supplement.

SALICYLIC ACID, a product of salicine, carbolic acid, and other substances. (See *SALICINE*.) When salicylöl is acted on by chromic acid or potassium hydrate, it becomes oxidized, forming potassium salicylate, with evolution of hydrogen ($C_7H_6O_2 + HOK = C_7H_5KO_2 + H_2$). The potassium salicylate is decomposed by the action of hydrochloric acid, liberating salicylic acid, $C_7H_6O_3$, with production of potassium chloride ($C_7H_5KO_2 + HCl = C_7H_6O_3 + KCl$). Oil of wintergreen (*Gaultheria procumbens*) also yields, by distillation with potash, methyl alcohol and salicylic acid. The latter may also be formed by passing dry carbon dioxide into warm phenol (carbolic acid), to which at the same time are added small pieces of sodium. The reaction forms sodium salicylate, from which salicylic acid may be obtained by the action of hydrochloric acid. It is this manner of producing salicylic acid which gives it importance both in a scientific and commercial point of view. Two German chemists, Kolbe and Lautemann, chose carbolic acid to experiment upon, with a view to produce salicylic acid, and its discovery is therefore not an accident. Salicylic acid crystallizes from an alcoholic solution by spontaneous evaporation in large, monoclinic, four-sided prisms. From a hot aqueous solution it separates on cooling into slender needles, often an inch long. It melts at $266^\circ F.$, and gives off phenol at a higher temperature. It has a sweetish sour taste, and reddens litmus paper strongly. It does not act on polarized light. It is very slightly soluble in cold, quite soluble in hot water, and still more in alcohol; and boiling oil of turpentine dissolves about one fifth of its weight. The acid solution imparts a deep red color to ferric salts. Salicylic acid has recently attracted much attention as a powerful anti-ferment, taking the place of carbolic acid or phenol as a dressing to wounds and ulcers, and as a general antiseptic. When considerably diluted it is almost odorless and tasteless, and in moderate quantities it has no poisonous effects. It prevents the souring of worts and beer, and is used by glue manufacturers to arrest putrefaction.

SALIERI, Antonio, an Italian composer, born in Legnano, Aug. 19, 1750, died in Vienna, May 7, 1825. In 1766 he went to Vienna with Gassmann the contrapuntist, who instructed him, and whom he succeeded in 1775

as court chapelmaster and director of the theatre there. Here he became so intimate with Gluck as to compose for him an opera, produced in Paris, entitled *Les Danaïdes*, the real authorship of which Gluck did not announce till it had been performed several times. Salieri wrote 43 operas, and various compositions for instruments and for the church, including his *Passione di Gesù Cristo*, five masses, and a requiem.

SALINE, a river of Arkansas, rising in the N. part of Saline co., and flowing S. E., S., and S. W. into the Washita river. Its length is about 200 m. It is navigable at high water by boats of considerable size 70 or 80 m. from its mouth. It has a number of small tributaries.

SALINE, the name of five counties in the United States. **I.** A central county of Arkansas, drained by Saline river; area, about 800 sq. m.; pop. in 1870, 3,911, of whom 185 were colored. The surface is level in the S. part and hilly elsewhere, and the soil is productive. Marble, quartz, and soapstone are found in large quantities. The chief productions in 1870 were 10,890 bushels of wheat, 186,040 of Indian corn, 15,899 of sweet and 5,874 of Irish potatoes, 69,292 lbs. of butter, 11,457 of honey, 3,816 of tobacco, 3,438 of wool, and 603 bales of cotton. There were 779 horses, 259 mules and asses, 1,518 milch cows, 2,350 other cattle, 2,049 sheep, and 11,221 swine. Capital, Benton. **II.** A S. E. county of Illinois; area, 370 sq. m.; pop. in 1870, 12,714. The surface is generally level and well timbered, and the soil is fertile. It is traversed by the Cairo and Vincennes railroad and a branch of the St. Louis and Southeastern. The chief productions in 1870 were 83,211 bushels of wheat, 531,516 of Indian corn, 69,793 of oats, 24,247 of Irish and 11,600 of sweet potatoes, 3,149 tons of hay, 1,155,941 lbs. of tobacco, 29,274 of wool, 198,462 of butter, and 23,252 gallons of sorghum molasses. There were 3,467 horses, 1,109 mules and asses, 2,888 milch cows, 4,542 other cattle, 15,018 sheep, and 20,576 swine. Capital, Harrisburg. **III.** A central county of Missouri, bounded N. and E. by the Missouri river, and intersected by the Black and Salt forks of La Mine river; area, 750 sq. m.; pop. in 1870, 21,672, of whom 3,754 were colored. The surface is mostly prairie and the soil fertile. Bituminous coal, lead, limestone, and sandstone are found; and there are numerous salt springs. The chief productions in 1870 were 396,645 bushels of wheat, 2,106,043 of Indian corn, 323,806 of oats, 80,670 of potatoes, 10,424 tons of hay, 215,475 lbs. of tobacco, 47,018 of wool, 339,108 of butter, 28,528 of honey, and 10,566 gallons of sorghum molasses. There were 8,083 horses, 3,279 mules and asses, 7,171 milch cows, 14,202 other cattle, 16,310 sheep, and 46,231 swine; 10 flour mills, and 10 saw mills. Capital, Marshall. **IV.** A central county of Kansas, intersected by the Saline and Smoky Hill rivers; area, 720 sq. m.; pop. in

1870, 4,246. It is traversed by the Kansas Pacific railroad. The soil is fertile. Timber grows along the streams, and there are salt springs. The chief productions in 1870 were 67,586 bushels of wheat, 225,048 of Indian corn, 20,931 of oats, 30,220 of potatoes, 40,331 lbs. of butter, and 10,862 tons of hay. There were 1,425 horses, 1,867 milch cows, 3,824 other cattle, and 1,392 swine. Capital, Salina. **V.** A S. E. county of Nebraska, intersected by Big Blue river and watered by its affluents; area, 576 sq. m.; pop. in 1870, 3,106. It is intersected by the Burlington and Missouri River railroad and the Beatrice branch. The surface is undulating and the soil fertile. The chief productions in 1870 were 19,061 bushels of wheat, 33,570 of Indian corn, 5,809 of potatoes, 11,885 lbs. of butter, and 1,051 tons of hay. There were 340 horses, 257 milch cows, 414 other cattle, 696 sheep, and 384 swine. Capital, Pleasant Hill.

SALISBURY, or **New Sarum**, a city of England, capital of Wiltshire, at the junction of the Avon, Wily, and Bourne rivers, 78 m. W. S. W. of London; pop. in 1871, 12,903. The cathedral was built between 1220 and 1260, by the bishop and canons of Old Sarum, 2 m. N., which place was in consequence deserted by its inhabitants for the new site. Since 1868 the exterior and interior have been completely restored. The principal manufacture is cutlery. The woollen manufacture, once famous, has become extinct.

SALISBURY. I. Robert Cecil, earl of. See **CECIL**. **II. Robert Arthur Talbot Gascoyne Cecil**, third marquis and eighth earl of, an English statesman, born Feb. 13, 1830. He was educated at Eton and Oxford, and from 1853 to 1868 was member of parliament for Stamford, being at first called Lord Robert Cecil, and after the death of his elder brother in 1865 Viscount Cranborne. In 1866-'7 he was secretary of state and president of the council for India. He succeeded to the peerage April 12, 1868. On the death of the earl of Derby, Oct. 23, 1869, Salisbury succeeded him as chancellor of the university of Oxford. In February, 1874, he became a member of Disraeli's administration as secretary of state for India. He is one of the most influential representatives of the tory party.

SALIVA. See **DIGESTION**, and **SALIVARY GLANDS**.

SALIVARY GLANDS, those glands which secrete the saliva, the principal of which are the parotid, the submaxillary, and the sublingual, disposed in pairs. The parotid, the largest gland, weighing from half an ounce to an ounce, is immediately below and in front of the ear and the zygomatic arch, reaching down as low as the angle of the lower jaw. Its outer surface, slightly lobulated, is covered by the skin and fascia, and its inner surface extends deeply into the neck by two processes, one of which dips behind the styloid process and beneath the mastoid process of the temporal bone

and the sterno-mastoid muscle, and the other is situated in front of the styloid process. The external carotid artery passes through the substance of the gland. It is also traversed by the posterior auricular, transverse facial, temporal, and internal maxillary arteries, by a venous trunk formed by the union of the temporal and internal maxillary veins, and by a branch connecting this trunk with the jugular vein. The facial nerve and its branches and the great auricular nerve pass through it from before backward. The internal carotid artery and internal jugular vein lie close to its deep surface. The duct of the parotid gland (the duct of Steno) is about $2\frac{1}{2}$ in. long, opening on the inner surface of the cheek by a small orifice opposite the second molar tooth of the upper jaw; it is dense, of considerable thickness, and its canal is about the size of a crow quill, composed of an external fibrous and internal mucous coat, lined with columnar epithelium. The gland is supplied with blood by branches of the external carotid artery, and with nerves from the carotid plexus of the sympathetic, the facial, the superficial temporal, the auriculo-temporal, and great auricular nerves; and its lymphatics terminate in the superficial and deep cervical glands. The submaxillary gland is situated below the lower jaw, within and just in front of the angle, lying upon the mylo-hyoid, hyo-glossus, and stylo-glossus muscles, and is separated from the parotid by the stylo-maxillary ligament. It is irregular in form, and weighs about two drachms. It is relatively smaller in the herbivora than in the carnivora, being in the latter larger than the parotid. The facial artery lies imbedded in a groove in its posterior and upper border. Its duct (Wharton's) is about 2 in. long, much thinner than that of the parotid, and opens by a narrow orifice by the side of the frænum of the tongue. The gland is supplied with blood by branches of the facial and lingual arteries, and its nerves are derived from the submaxillary ganglion, from a branch of the inferior dental, and from the sympathetic. The sublingual gland is the smallest, weighing about a drachm. It is situated in the floor of the mouth at the side of the frænum linguae, in contact with the inner surface of the lower jaw, close to its symphysis. Its excretory ducts are from 8 to 20 in number, very short, and open on the crest or projection formed by the gland itself. One or more join to form a duct known as the duct of Bartholin, which opens into Wharton's duct. The gland is supplied with blood from the sublingual and submental arteries, and with nerves from the gustatory nerve.—These three pairs of glands are of the kind called conglomerate, consisting of numerous lobes composed of smaller lobules connected together by areolar tissue, vessels, and ducts. There are other small glands lying in and beneath the mucous membrane of the mouth, such as the labial and buccal glands, the follicular glands of the tongue,

and certain glandular bodies in the mucous membrane of the pharynx. (See PHARYNX.) Prof. Dalton obtained pure parotid saliva from the human mouth by introducing a silver tube into the duct, and arrived at many important facts regarding its functions. In one observation 480 grains of the secretion flowed from the tube in 20 minutes. The secretion takes place most rapidly during mastication, and on that side of the mouth where the mastication is performed, as has been shown by Colin and confirmed by Dalton. The flow is also active upon the sight or perception of the odor of food, and also from the influence of the imagination. Bernard has shown that galvanization of the small root of the fifth pair of nerves, and of the facial, immediately produces profuse secretion from the parotid. Parotid saliva is clear and limpid, and differs in composition somewhat from that of the submaxillary and sublingual glands. It contains organic matter, sulpho-cyanide of sodium, phosphate of lime, chlorides of potassium and sodium, and carbonate of soda. The function of parotid saliva is now generally regarded as chiefly to assist in mastication and deglutition. Pure submaxillary saliva was first studied as a distinct fluid by Bernard. It is more viscid than that from the parotid, but is perfectly clear, and on cooling becomes gelatinous. Its organic matter is not coagulated by heat. Bernard regards the function of submaxillary saliva as exclusively connected with gustation or tasting, and says its secretion only takes place under the stimulus of the gustatory nerves. The secretion of the sublingual is more viscid than that of the submaxillary, but does not gelatinize on cooling. Like the secretion from the other salivary glands, it is decidedly alkaline. Its organic matter is not coagulated by heat, acids, or metallic salts. The functions and properties of the mixed saliva of all the glands of the mouth are stated in the article DIGESTION.

SALLE, Jean Baptiste de la. See LA SALLE.

SALLET, Friedrich von, a German poet, born in Neisse, Silesia, April 20, 1812, died at Reichau, Feb. 21, 1843. He was descended from French Protestant refugees. After serving in the army, he published in 1830 a satirical novel on military life, and was sentenced to ten years' imprisonment, which the king reduced to two months. His principal work, *Laienevangelium* (Breslau, 1839; 6th ed., 1861), is a eulogy of pantheism. His complete works were published in 5 vols. (Breslau, 1845-'8; new ed., 1864).

SALLUST (CAIUS SALLUSTIUS CRISPUS), a Roman historian, born at Amiternum, in the country of the Sabines, in 86 B. C., died in 34. He belonged to a plebeian family, and about the age of 27 obtained the quaestorship. In politics he allied himself with the faction of Cæsar, was a tribune of the people in 52, and in 50 was expelled from the senate by the censors Appius Claudius and Piso on the ground of adultery with Fausta, the daughter of Sulla,

but in reality, probably, on account of his opposition to the aristocratic party. In 47 he was prætor, and in 46 he accompanied Cæsar in his expedition to Africa. He was appointed governor of Numidia, and, after acquiring an immense fortune by plundering the inhabitants, devoted the remainder of his life to literary pursuits and the embellishment of his splendid gardens on the Quirinal hill. Dion Cassius and other authors ascribe to him almost every species of profligacy and crime. He wrote *Bellum Catilinarium*, a history of the conspiracy of Catiline; *Bellum Jugurthinum*, a history of the war against Jugurtha; and *Historiarum Libri V.*, comprising the period between 78 B. C., the year of Sulla's death, and 66, and forming, with the other two works, a connected history of Roman affairs for 45 years. The last exists only in a few fragments. Of the numerous editions of the "Jugurthine War" and the "Conspiracy of Catiline," the first is that of Venice (fol., 1470), and one of the best that of Gerlach (3 vols. 4to, Basel, 1823-'31), the latter containing, in addition, the fragments of the lost books. There are numerous translations of Sallust into English, the oldest by Barclay (1511), and recent ones by Watson (1852), by Dr. Giles (1862), and by J. R. Mongan (1864).

SALMASIUS, Claudius (CLAUDE DE SAUMAISE), a French scholar, born at Semur-en-Auxois, April 15, 1588, died in Spa, Sept. 6, 1653. In his boyhood he wrote Greek and Latin verses. He completed his studies in Paris and Heidelberg, and became a Protestant. He was invited to Venice, Oxford, and Rome, but preferred in 1632 the university of Leyden, and returned there in 1640 after a visit to Paris, although offered a large pension if he would become Richelieu's biographer. At the instigation of Charles II., then a refugee in Holland, he wrote in 1649 *Defensio Regia pro Carolo Primo*, which led to Milton's celebrated reply, *Pro Populo Anglicano Defensio* (1650). In the same year he visited Queen Christina of Sweden, but returned in 1651 to Leyden. His most important work is *Plinianæ Exercitationes in Solinum* (2 vols. fol., Paris, 1629; new ed., Utrecht, 1689).

SALMON, the common name of the soft-rayed fishes of the genus *salmo* (Cuv.). The old genus *salmo* of Artedi and Linnæus has been subdivided into the three principal families of *salmonidæ*, *characini*, and *scopelidæ*, of which only the first concerns us here; this, besides the salmon and trout, includes the smelt, capelin (*mallothus*), grayling, whitefish, and others. The genus *salmo* has the cheeks or whole head covered with scaleless integument, and the rest of the body with cycloid, thin, small scales; there is an adipose fin on the back near the tail, over the anal, and the dorsal is over the ventrals; the branchiostegal rays vary from 12 to 19, and there is a false gill on the inner side of the operculum; the edge of the upper jaw is formed by the maxillaries as well as

the premaxillaries; the air bladder is always present, large and simple, opening into the pharynx; the intestinal canal is short, with numerous pyloric cæca; the ovaries form closed sacs without oviducts, and the eggs enter the cavity of the abdomen, whence they pass out by an opening behind the anus. The names salmon and trout have been applied in the most indefinite and contrary manner, by different authors and in both hemispheres, to the fishes of this genus; those by almost universal consent called salmon will be alluded to here, leaving for the article Trout the brighter spotted and usually smaller and fresh-water species. According to Prof. Rasch of Norway, many so-called species of the *salmonidæ* produce fertile offspring *inter se*; the spawn of the true salmon fecundated by the common trout has been known to produce 40 per cent. of a well shaped prolific brood; showing either that hybrids are not sterile, or that the limits of the species cannot be defined. Even the genus as restricted by Cuvier has been subdivided into three by Valenciennes according to the distribution of the vomerine teeth; in *salmo* (Val.) there are strong conical teeth in both jaws and a small group at the end of the vomer; the palate bones and the sides of the tongue are also armed with teeth; in *fario* (Val.), including the salmon trout, there is in addition a single mesial line of teeth on the vomer; and in *salar* (Val.) the vomer has two rows of teeth. Species called salmon and species called trout are found in each of these subdivisions, but the last two contain chiefly those called salmon trout and trout. The salmons are of great importance to man as an article of food, and are the most esteemed of any fresh-water fish; the number of men and the amount of capital employed in this fishery are very great; their flesh is eaten fresh, salted, smoked, dried, and pickled. The species, which are numerous, inhabit the sea and fresh waters, some migrating from the ocean to rivers at the breeding season; they spawn in shallow streams, both sexes assisting in forming the bed; they are found in the northern waters of Europe, Asia, and America, even in small streams, in the cold water of the arctic zone, and as high as the regions of perpetual snow; none have been found in South America, the East Indies, or Africa. They are unmistakably alluded to by Pliny and Ausonius.—At the head of the true salmons, or those having the body of the vomer smooth, stands the common salmon (*S. salmo*, Val.; *S. salar* of authors). In this the head is large, the gape wide and well furnished with teeth; the gill openings are very large, and consequently death very soon takes place out of the water; the abdominal outline is much more curved than the dorsal; the snout pointed, and the body rather slender and fusiform; the form is elegant, and the movements are rapid and vigorous. The color is slaty blue on the back, darkest on the head, duller and slightly silvery

on the sides, and beneath pearly silvery white; there are numerous black spots above the lateral line; the dorsal, pectorals, and caudal are



Common Salmon (*Salmo salar*).

dusky, the anal white, and the ventrals white externally and dusky internally; the gill covers are rounded posteriorly, and the tail is nearly square in the adult, but forked in the young; the scales are delicate, and sunk in the thick and fatty skin. As seen in the markets they are generally not more than 3 ft. long, though they attain a much greater size. From the northern seas they enter the rivers when swollen by the rains and more or less turbid and deep, remaining for a time in the brackish estuaries; they are probably able to detect the mixture of the waters through the nostrils, which are freely supplied with nervous filaments; they ascend during the flood, at the rate of 15 to 25 m. a day, resting in pools when the water is unfit for their progress; the females ascend before the males. Having attained the requisite height, as the cold weather comes on they take measures to deposit their spawn; at this time the female becomes very large, and her silvery tints dull gray; the male becomes thinner on the back, the nose longer, the under jaw turns up in a strong hook which enters a hollow in the nose, and the colors become brown and red. A furrow, 6 to 9 in. deep, is excavated in the bottom, principally by the female; in this the spawn is deposited, impregnated, and covered with gravel by the fish. The spawning process consumes from 8 to 12 days, and at the end of it the fish are very much emaciated, the scales are cast off, and they retire to some quiet place to regain their strength; in this condition they are called kelts, and are unfit for food. The eggs remain covered by the gravel all winter beneath the ice, and begin to be hatched by the end of March or commencement of April; experiments prove that the eggs are hatched in 114 days when the temperature of the water



Young Salmon.

is at 36° F., in 101 at 43°, and in 90 at 45°. The young come out from the gravel when about an inch long; these are called parr, and

remain a year in fresh water; when 4 to 6 in. long they receive the name of smolts, and are greenish gray above and silvery below, with very deciduous and delicate scales, in which state they descend to the sea; after about two months' sojourn there they ascend the rivers again, weighing 2½ to 4 lbs., and are then called grilse; they spawn during the winter, and then are entitled to the name of salmon; descending and returning the following season, they weigh 10 to 15 lbs., and may go on increasing to 60 or 70 lbs.; but now a salmon of 30 lbs. is considered very large, as from the injudicious methods of fishing both in Europe and this country most are caught in the condition of grilse or younger. According to Dr. Davy, the eggs retain their vitality for many hours in the air, if moist and cold (even to 32° F.), but not more than an hour if dry and at ordinary temperatures; both the ova and young fish will bear a heat of 80° or 85° in water for a short time, but die in water above 84° or 85°; they perish also in salt or brackish water. In their descent to the sea they generally remain for a time in brackish water, getting



Salmon One Year Old.

rid of their fresh-water parasites (crustaceans which attach themselves to their gills), and they do the same thing before they ascend the rivers, which frees them from marine parasites. This species is very extensively distributed in northern Europe and America, being found in Great Britain, the Orkneys, France, Belgium, Holland, Germany, Russia, Denmark, Sweden, Norway, and Iceland, getting access from the English channel and the northern seas by the Tweed, Tay, Severn, Loire, Rhine, Elbe, &c.; it does not occur in rivers falling into the Mediterranean, and does not come below the 45th parallel of latitude; in North America it frequents the rivers of Labrador, Canada, Newfoundland, Nova Scotia, New England, and those of New York communicating with the St. Lawrence, ascending even to Lake Ontario. Salmon can live without access to the sea, as is seen in Sebago and other landlocked lakes of Maine, but they are of inferior size and quality. It is well known that the salmon has the power of swimming with great velocity, of stemming rapid rivers, and of jumping over dams and waterfalls of considerable height; they have been known to spring 14 ft. out of water, and to describe a curve of at least 20 ft. in order to surmount a cascade; if not successful at first they persevere till they succeed, unless the obstruction be insurmountable; these efforts they

are able to make by their powerful and active muscles, and especially by the strong and fleshy tail. Ascending the rivers from June to September, their shoals are attended by porpoises, seals, and carnivorous fish, which find them an easy prey; it is popularly believed that they return to the river in which they were hatched, which in their immense numbers would be likely to happen to some, but more unlikely, as the fact proves, to the greater portion. The salmon is very voracious, and grows rapidly; in the sea it feeds principally on small fishes, especially the sand eel (*ammodytes*), crustaceans, the ova of echinoderms, &c.; it is believed that it eats very little while in fresh water from its thin appearance, but the emaciation would be sufficiently accounted for by the waste incidental to the breeding season. In the sea salmon very rarely bite at a hook, but in rivers and estuaries they will rise to artificial flies. For an interesting account of salmon fly fishing the reader is referred to Sir Humphry Davy's "Salmonia, or the Days of Fly Fishing." They are speared by the American Indians, and also in the Scottish rivers. Where salmon fishing is pursued as a business, they are taken in nets, usually in gill nets, stretched across the mouths of the rivers. Many hundred salmon of good size are often taken at a single haul of a seine, and some of the English fisheries furnish annually more than 200,000; the fisheries of Scotland and Norway are also very profitable. Rivers are let out to sportsmen with the exclusive right of fishing for salmon; the streams of the British provinces in America are frequently thus disposed of both to native and foreign anglers. The river Thames was once celebrated for its salmon, but its stream is now too impure to invite them to enter. The Merrimack river in Massachusetts formerly swarmed with salmon weighing from 9 to 12 lbs., but the numerous dams and manufacturing establishments have driven them away, and the northern markets are now supplied from the Kennebec river and the British provinces, and from the Pacific coast. The salmon enters the rivers of Nova Scotia in the latter part of April, the rivers emptying into the bay of Fundy a month later, and those emptying into the gulf of St. Lawrence in June; the females arrive first, and the males about a month after, and the grilse ascend during July and August. They spawn late in autumn, most of them returning to the sea before the rivers are frozen over, but some remaining in fresh water all winter and going to the sea in the spring; the ova are cast when the water is at most at 42° F., in shallow, pure, and rapid streams. Among the noted rivers for fly fishing are the Gold and St. Mary's in Nova Scotia, and the S. W. Miramichi and Nepisiguit in New Brunswick. The flesh is exceedingly delicate, and of a tint of pink which has received therefrom the name of salmon-colored; the delicacy of the flesh is no doubt due to the ova of echino-

derms and crustaceans which form their chief food, and the intensity of the red color seems to be in proportion to the quantity of the *gammarina* (minute amphipod crustaceans) which they devour. As with all fish which swim near the surface, it should be eaten when fresh, as the flavor is rapidly lost after death. The salmon is one of the fish to which the attention of pisciculturists has been directed, from the ease with which artificial fecundation is effected, the successful results obtained, and the value as food. In the Penobscot river in November, 1871, the Russian method of fecundation, that of carefully keeping the eggs and milt from water until they have come in contact, was practised with such success that 96 per cent. of the eggs were fecundated, a very much larger proportion than in the natural operation; 70,000 eggs from 10 females, thus fertilized, were sent in December to other parts of Maine, Massachusetts, and Connecticut. From the ninth annual report of the commissioners of fisheries of Massachusetts, for the year ending Jan. 1, 1875, it appears that their chief work consisted in hatching the eggs and planting the young of the California and Maine salmon; a few landlocked salmon from Sebec were also distributed to different parts of the state. Salmon eggs have also been carried from Scotland to New Zealand.—The *S. hamatus* (Cuv.), regarded by Bloch and other naturalists as the old male of the preceding species, has the back reddish gray, the sides brighter, and lower parts dull white; there are black spots above the lateral line, and some red markings, and the fins are bordered with blackish; the lower jaw in both sexes and in the young has a terminal hook turned upward and received in a depression near the union of the intermaxillaries; the mouth is very large from the elongation of the jaws, and is armed with strong teeth. The true salmon enters the rivers in summer, but this species ascends between October and the end of February, so that the two are not found together except at the end of the fishing season; the flesh is lighter colored and drier than in *S. salar*, and is hence less esteemed; it is found in the rivers of western Europe, but a specimen so named by Agassiz was caught in 1860 in the Merrimack river, showing that species which generally leave their arctic retreats for the European shore sometimes descend on the American coast. In the *S. hucho* (Val.), the salmon of the Danube, the body is longer and rounder than in the common salmon; it is grayish approaching to violet on the back, silvery white on the sides and below, the head and dorsals with a greenish tint, and the other fins yellowish; above the lateral line are black spots, smallest in the largest fish; as in other salmons, the young have seven or eight dark vertical bands on the body, which disappear with age; it attains a weight of 30 or 40 lbs., and is not found in the rivers opening into the Baltic; the flesh is white, but

softer and less agreeable than in the common species; the spawning season is in June. For other species of old world salmon, see Cuvier and Valenciennes's *Histoire naturelle des poissons*, vol. xxi. Among the American species the arctic salmon (*S. Rossii*, Rich.) deserves mention; it grows to a length of 2 or 3 ft., and has a more slender form than the common salmon; the color above is brownish green, the sides pearly gray with bright red dots near the lateral line, and red below; the under jaw is considerably the longer; the scales small, and separated from each other by smooth skin; it is found in the arctic seas and in the rivers therewith communicating so abundantly, that over 3,000 were taken at a single haul of a net during one of the expeditions of Sir John Richardson. Many other species of the arctic seas, on the E. and W. coasts of North America, are described and figured in Richardson's "Fauna Boreali-Americana," and many since his time have been described from the Columbia river and its tributaries, and from the rivers of the N. W. coast. (See "Report of United States Commission of Fish and Fisheries," by Prof. Baird, part ii., 1875.)

SALMON TROUT. See TROUT.

SALNAVE. See HAYTI, vol. viii., p. 553.

SALO, Gasparo da, an Italian violin maker, born at Salo, on the lake of Garda, about 1540, died in Brescia about 1614. He was a contemporary of the Amatis, and was one of the first to bring the instruments of the violin family to perfection. His instruments were large in their proportions and of great body and brilliancy of tone, double-purified, and having large sound holes. In general they were long, having the arch of the belly high and extending almost up to the sides. They resemble in their general characteristics those of Stradivarius rather than those of the Amatis and their imitators. He excelled in his varnish, which was of a rich brown. He left many violas and double basses. Dragonetti, the great contrabassist, played upon one of his instruments, presented to him by the convent of St. Mark in Venice, to which it was returned on his death. One of the best of his violins is owned by Ole Bull, having figures carved by Benvenuto Cellini. Salo worked at his trade in Brescia for 50 years. A violin of his is extant dated 1566, and another of 1613.

SALOMON ISLANDS. See SOLOMON ISLANDS.

SALONA, the Roman capital of Dalmatia, near the present Spalato (anc. *Spalatum*). (See SPALATO.)

SALONICA, or *Saloniki* (Turk. *Selanik*; anc. *Therma*, and afterward *Thessalonica*), a walled town of Turkey in Europe, capital of a vilayet of its own name (see MACEDONIA), at the head of the gulf of Salonica, anciently called the Thermaic gulf, 305 m. W. by S. of Constantinople; pop. about 70,000, including nearly 20,000 Jews and about as many Greeks. The town is on the slope of a steep hill. It is celebrated for the number and beauty of its

churches. Among them are the church of St. George, resembling the Roman Pantheon, which some consider to have been a temple of the Cabiri, and the former church of St. Sophia, now a mosque, in which St. Paul is said to have preached. A triumphal arch at the W. extremity of the Via Egnatia is believed to have been erected by the people of Thessalonica in honor of Augustus, and in memory of the battle of Philippi; it is 12 ft. wide and 18 ft. high, and is constructed of large blocks of marble. Another arch is of brick faced with marble, has camels sculptured on it, and is supposed to commemorate the victory of Constantine over the Sarmatians. The castle by which the town is defended is partly Greek and partly Venetian. Woollen and silk goods and hardware are manufactured. In 1872 the value of the exports was \$6,778,000, and of the imports \$7,294,000; and during the same year 642 vessels of an aggregate of 179,000 tons entered the port. Within a few years the trade has materially fallen off.—Salonica was first known in history as *Therma*, being so called from the hot springs near it. About 315 B. C. it was enlarged by Cassander of Macedon who named it Thessalonica after his wife, the daughter of Philip. Xerxes rested his army here. It was occupied by the Athenians about 432, and afterward became the chief Macedonian naval station. It surrendered to the Romans after the battle of Pydna, and under the empire it was the capital of the Illyrian provinces. Cicero took refuge here during his exile. The apostle Paul visited it about A. D. 52, and addressed epistles to its church. In consequence of a riot the city was subjected to a frightful massacre by the emperor Theodosius in 390. It took a prominent part in the Gothic and Slavic wars, but was captured by the Saracens in 904, when the population amounted to 220,000. The Normans from Sicily took it in 1185. It was held during the first half of the 13th century by Boniface of Montferrat, and afterward by the Venetians; and it was finally captured by the Turks in 1430. A butchery of Greeks took place here in 1822, in consequence of insurrectionary movements in the neighborhood.

SALOP. See SHROPSHIRE.

SALSETTE (native name, *Sashthi*), an island in the presidency of Bombay, 18 m. long and 10 m. wide; area, about 150 sq. m.; pop. estimated at 50,000. It is connected with the island of Bombay by an arched stone bridge and by a causeway built at the expense of Sir Jamsetjee Jejeebhoy, and with the mainland by the viaduct of the Peninsular railway. In the central hill of Keneri and elsewhere there are famous ancient rock-cut cave temples. The chief town is Thanah. Salsette came into the possession of the Portuguese in the 16th century, and was wrested from them in 1739 by the Mahrattas, who were dispossessed by the British in 1774.

SALSIFY. See OYSTER PLANT.

SALT, sodic chloride, sea salt, or common salt, the substance which is always denoted when the word "salt" is used in ordinary language. The word is derived from the Greek, in which $\alpha\lambda\varsigma$ in the feminine is used for the sea, and $\alpha\lambda\varsigma$ in the masculine for the solid product left when sea water evaporates. It is sometimes also called muriate of soda. It may be formed by burning sodium in chlorine gas, or by neutralizing hydrochloric acid with sodium carbonate, and evaporating. It occurs very abundantly in nature, both in the solid state, as rock salt, and in solution in sea water, salt lakes, and salt springs; also in smaller quantity in river water. Mines of rock salt have been recently explored in the Caucasus, in which the stone implements were found as they were left at a date so remote that no tradition exists of the time when they were worked. The mines of Wieliczka in Austrian Galicia have been worked for at least six, but probably for upward of eight centuries. The springs of Droitwich in England were worked by the Romans, and in Cheshire "the Wiches" were very productive in the reign of Edward the Confessor. Little is understood of the origin of rock salt. Some beds, as those of Cheshire, appear to have been produced by the drying up of bodies of sea water cut off from the ocean, while in other cases, as at Bex, where the salt forms a perpendicular vein or dike, its origin is altogether obscure. Salt lakes are derived either from the partial drying up of isolated bodies of sea water, as the Dead sea, or by the evaporation of lakes without outlets, and fed by streams which have passed over beds of salt, or plains impregnated with it, as Great Salt lake, Lake Urumiah in Persia, and many of the lakes of South America. Saline incrustations often overspread the surface of plains in Russia, India, the South American pampas, and the regions E. and W. of the Rocky mountains. The salt of the ocean has doubtless resulted from the chemical changes which have taken place between the elements that constitute the earth's crust during former geological epochs. The waters of the open ocean contain on an average 33.8 parts of salt in 1,000, of which 26.8 in 1,000 are common salt, equal to about 4 oz. in a gallon, or a bushel from 300 or 350 gallons. The entire quantity of salt in the ocean is estimated by Schaffhäutl at 3,000,000 cubic miles. The water of landlocked seas like the gulf of Mexico or the Mediterranean sea contains more salt than that of the open ocean, and it is also found that the water of the bottom of such seas is saltier than that upon the surface.—Salt crystallizes in colorless, transparent, anhydrous crystals, belonging to the isometric system, and has a very perfect cubic cleavage, which generally displays itself even in the great masses of rock salt, parts of which however are frequently massive and granular, and rarely fibrous or columnar. But the most characteristic peculiarity of the crystallization of salt is the for-

mation of the hopper-shaped crystals on the surface of a saline solution during evaporation. A single cube appears at first, which partially sinks in the liquid, and new cubes then form and attach themselves to its upper edge, till by a repetition of this process a hollow rectangular pyramid, sometimes of considerable dimensions, and with the apex downward, is finally produced. Crystals of this form occur in some salt mines, and casts of them in clay are found in the New York salt region and some other places. Salt has a specific gravity of 2.1 to 2.257, and a hardness between gypsum and calc spar. It is transparent to translucent, and its color varies from white to yellowish, reddish, bluish, and purplish. It is of all substances the most perfectly diathermanous or transparent to heat of every degree of refrangibility. (See DIATHERMANCY.) At 32° F. 100 parts of water dissolve 35.52 parts of pure salt; and at 229.5°, the boiling point of a saturated solution, only 40.35 parts are dissolved. This almost uniform solubility at all temperatures furnishes the means of separating it from many of the foreign salts with which it is associated in sea water and brine springs. Rock salt dissolves much more slowly, even in fine powder, than sea salt and that from springs, and the coarsely crystallized salt than the finer varieties. These differences are of economical importance, especially in curing provisions. For the principle of its curative properties see PRESERVATION OF FOOD. The freezing and boiling points of solutions rise with the degree of concentration. Salt is fusible at a red heat, and volatile at a still higher temperature. Its volatility is made use of in the process of "salt-glazing" common earthenware. (See POTTERY AND PORCELAIN, vol. xiii., p. 788.) Artificial crystals generally decrepitate when heated, from the presence of water mechanically enclosed between their layers. Some specimens of rock salt from Wieliczka decrepitate when dissolved in water, and disengage a gas, which is sometimes pure carburetted hydrogen, and sometimes a mixture of this with hydrogen and oxide of carbon.—Salt is a compound of one atom of chlorine combined with one atom of sodium; chemical symbol, NaCl; molecular weight, 58.5. When it is heated to redness with silica, silicate of sodium and hydrochloric acid are formed. A process for manufacturing soluble glass is based on this reaction. With oil of vitriol it gives sulphate of sodium and hydrochloric acid. This is the first step in Le Blanc's process for soda ash. Salt is rarely if ever obtained pure. The chief impurities in rock salt are sulphate of lime, oxide of iron, and clay; but besides these the chlorides of potassium, calcium, and magnesium, the sulphates of soda and magnesia, and bituminous matters are occasionally met with, and some varieties are even colored by the presence of infusoria. In salt made from sea water, the salts of magnesia with a little sulphate of lime are the principal

impurities. All the varieties of salt occasionally contain minute quantities of bromides and iodides. The following table exhibits the composition of salt from various sources:

VARIETIES OF SALT.	Chk ride of sodium.	Chloride of potassium.	Chloride of calcium.	Chloride of magnesium.	Sulphate of potash.	Sulphate of lime.	Sulphate of magnesia and soda.	Carbonates.*	Alumina and iron.	Residue.	Water.	Percentage of saline residue.	AUTHORITIES.
ROCK SALT.													
Wieliczka, white.....	100.00	.....	.....	trace	..	..	..	..	..	..	..	..	Bischof.
Berchtesgaden, yellow...	99.928	.....	.....	0.07	..	..	..	..	..	..	..	..	"
Hall in Tyrol.....	99.43	.....	0.25	0.12	0.20	..	..	..	..	..	..	..	"
Stassfurt.....	94.57	.....	0.97	0.89	..	..	..	..	1.12	2.23	0.22	..	Heine.
Hallstadt in Up. Austria.	98.14	trace	.....	1.86	..	..	..	..	0.20	..	..	..	Bischof.
Vie in German Lorraine.....	99.30	.....	.....	0.50	..	..	..	..	..	..	..	..	Berthier.
Jeb-el-Melah, Algeria.....	97.00	.....	.....	3.00	..	..	..	..	..	..	..	..	Fournet?
Ouled Kebbah, Algeria.....	98.53	.....	0.93	0.54	0.46	..	..	..	..	..	..	..	Fournet.
Cheshire, England.....	99.52	.....	0.02	0.46	3.50	0.08	..	..	..	..	0.14	..	G. H. Cook.
Carriekfergus, Ireland.....	96.28	.....	.....	..	..	..	..	..	..	..	..	..	"
Holston, Virginia.....	99.55	trace	.....	trace	0.79	..	0.45	..	..	..	0.33	..	C. B. Hayden.
Petite Anse, Louisiana.....	98.88	trace	.....	trace	1.48	..	..	..	..	0.01	0.07	..	Goessmann.
Santo Domingo.....	98.93	.....	0.04	..	..	..	..	..	..	..	..	..	"
SEA SALT.													
Turk's island.....	96.76	.....	.....	0.14	1.56	0.64	..	..	..	..	0.90	..	G. H. Cook.
St. Martin's.....	97.21	.....	.....	0.26	0.54	0.24	..	..	..	..	1.75	..	"
St. Kitt's.....	99.77	.....	.....	0.01	0.08	..	..	..	..	..	0.14	..	"
Curacao.....	99.85	.....	0.03	0.12	..	..	..	..	..	..	..	..	"
Caliz.....	95.76	.....	0.57	0.75	0.48	..	..	..	..	..	2.44	..	"
Lisbon.....	94.17	.....	1.11	0.49	1.39	..	..	..	..	..	2.84	..	"
Trapani, Sicily.....	96.78	.....	0.49	0.41	0.68	..	..	..	..	..	1.64	..	"
Martha's Vineyard.....	94.91	.....	0.24	1.42	0.19	..	..	..	..	..	3.24	..	"
Texas.....	99.46	.....	.....	0.10	0.30	..	..	..	..	..	0.14	..	"
SALT FROM SPRINGS AND LAKES.													
Cheshire, England.....	96.36	.....	0.01	0.02	1.17	..	..	..	..	..	2.44	..	"
Dieuze, German Lorraine.....	97.59	.....	.....	..	1.02	0.89+	..	..	..	..	0.50	..	"
Droitwich, England.....	96.93	.....	.....	0.02	3.05	..	..	..	..	..	..	..	"
Goderich, Ont.....	97.03	.....	0.01	0.03	1.43	..	..	..	..	..	1.50	..	Goessmann.
Onondaga, N. Y.....	97.41	.....	0.15	0.18	1.26	..	..	..	..	..	1.00	..	G. H. Cook.
Pittsburgh, Pa.....	96.70	.....	0.53	0.07	..	..	..	..	..	..	2.70	..	"
Kanawha, W. Va.....	91.31	.....	1.26	0.43	..	..	..	..	..	..	7.00	..	"
Holston, Va.....	99.11	.....	.....	..	0.68	0.11+	..	..	..	..	0.10	..	"
Saginaw, Mich.....	92.97	.....	1.09	0.50	0.33	..	..	..	0.01	5.10	..	..	"
Hocking Valley, O.....	95.07	.....	0.61	0.04	0.10	..	..	..	..	3.40	..	..	Goessmann.
Pomeroy, O.....	96.42	.....	0.53	0.18	..	..	..	0.05	0.16	2.66	..	..	E. S. Wayne.
Nebraska.....	98.12	.....	0.07	..	0.24	0.39+	..	..	..	0.80	..	..	Goessmann.
Kansas.....	98.06	.....	.....	0.24	1.12	0.35+	..	..	..	4.80	..	..	"
Onondaga, "factory filled"	98.28	.....	.....	..	0.91	0.09	..	..	0.12	0.60	..	..	"
Great Salt lake.....	97.61	.....	.....	..	1.03	0.08	..	..	..	1.28	..	..	G. H. Cook.
Elton lake, Russia.....	98.95	.....	.....	0.19	0.51	0.35+	..	..	..	..	..	..	Göbel.
SOLID RESIDUE OF BRINES AND SEA WATER.													
Halle in Prussian Saxony	94.43	0.21	1.03	1.69	2.23	0.39	0.18	..	..	..	12.28	..	Meissner.
Stassfurt.....	94.49	.....	.....	0.99	0.34	2.80	1.20+	0.06	trace	..	17.16	..	Heine.
Schönebeck.....	95.71	0.08	.....	1.09	0.08	1.61	1.87	..	..	..	2.00	..	Herrmann.
Artern, from bore in rock salt.....	95.85	0.45	.....	1.59	1.10	1.51	..	..	..	..	26.50	..	Heine.
Dürrenberg.....	89.88	.....	.....	1.49	0.99	0.04	0.63+	0.17	6.77§	0.02	8.89	..	"
Nauheim.....	82.23	1.63	6.74	1.18	..	0.18	7.63	..	0.07	..	2.87	..	Bromeis.
Soden.....	86.01	1.51	.....	2.24	..	0.65	8.79	..	0.50	..	1.27	..	Figuer and Mialhe.
Cheshire.....	97.40	.....	0.25	0.25	1.90	..	..	0.20	..	..	26.00	..	Wm. Henry.
Dieuze.....	84.87	.....	.....	..	1.53	3.80+	..	..	..	..	15.20	..	G. H. Cook.
China.....	75.47	.....	17.92	5.97	..	..	..	..	..	..	21.20	..	Boussingault.
Onondaga.....	95.42	.....	0.84	0.64	3.09	..	0.01	..	..	..	18.54	..	G. H. Cook.
Pittsburgh.....	81.27	.....	13.93	4.80	..	..	..	..	..	..	2.80	..	"
Kanawha.....	79.45	.....	16.48	4.07	..	..	..	..	trace	..	9.20	..	"
Holston.....	98.39	.....	.....	..	1.22	0.39+	..	..	trace	..	26.40	..	"
Salt lake, Texas.....	97.08	.....	.....	..	0.82	2.10+	..	..	..	..	24.90	..	"
Sea water.....	78.61	1.84	.....	8.56	3.47	6.42+	0.27	..	..	..	8.74	..	Usiglio.
Elton lake.....	13.15	0.79	.....	67.80	..	18.26+	..	..	..	..	29.13	..	Rose.
Dead sea.....	29.86	2.51	11.81	55.45	0.37	..	..	..	..	..	26.42	..	Booth and Muckle.
Great Salt lake.....	90.07	.....	.....	1.12	..	8.18+	..	..	..	..	22.42	..	L. D. Gale.

An examination of this table will show that the impurities differ both in kind and in quality. More or less sulphate of lime and chloride of magnesium are found in salt from whatever

locality or source it may be derived. The purest rock salt is the best of all; next to that is sea salt, and then the average quality from brine springs; but the table shows that the

* The carbonates are mainly of lime, except in the Holston rock salt, which contains magnesia only. The brines of Nauheim, Onondaga, Kanawha, and many others, as well as sea water and that of the Dead sea, contain traces of bromides

and iodides. The dry residue of sea water from the Mediterranean contains 1.47 per cent. of bromide of sodium.

† Sulphate of magnesia only.

‡ Sulphate of soda only.

§ Silicate of soda.

"Onondaga factory filled salt" is as pure as the rock salt of Cheshire, England, which is one of the purest known. An impurity of 3 per cent. renders salt unfit for domestic purposes, especially if the impurity consist of chlorides of calcium and magnesium, particularly the former.—Beds of rock salt and brine springs occur in geological formations of almost every period. The New York springs are in the upper Silurian, and most of those of western Pennsylvania and Virginia, of Michigan, Ohio, Indiana, Illinois, and Kentucky, in the lower coal measures; most of the Russian mines and springs are in the Permian; those of Cheshire in England, Ireland, eastern France, Würtemberg, and many other parts of Germany, in different members of the triassic group; those of the Austrian Alps in oolitic beds; those of the Pyrenees and of Cardona in cretaceous rocks; while those of Wieliczka in Galicia, of Tuscany, Sicily, and Petite Anse belong to tertiary strata. Its most invariable mineral associate is gypsum or hydrated sulphate of lime; in some places, as at Bex in Switzerland, this is replaced by anhydrite, or the same mineral without water; while polyhalite (a mineral consisting of sulphates of lime, magnesia, potash, and soda), bitumen, sulphur, and calc spar also frequently occur with it; and in many places, as in the wells in the coal formation, a copious discharge of carburetted hydrogen gas accompanies the flow of brine, and also jets of rock oil. (See *PETROLEUM*, vol. xiii., p. 370.)—Geographically salt is widely distributed. Excepting Norway, Denmark, and Holland, the European countries are all provided with salt to some extent from domestic sources, and even in some of these rock salt is imported and refined. The principal mines of rock salt are those of Wieliczka in Galicia; at Hall in the Tyrol, and along the mountain range through Aussee, in Styria, Ebensee, Ischl, and Hallstadt in Upper Austria, Hallein in Salzburg, and Reichenhall in Bavaria; in Hungary in the county of Mármaros; in Transylvania, Moldavia, and Wallachia; at Vic and Dieuze in German Lorraine; at Bex in Switzerland; in the valley of Cardona and elsewhere in Spain; in the region around Northwich in Cheshire, England; near Carrickfergus, Ireland; and in the government of Perm in Russia. The principal salt springs are in Cheshire, Worcestershire, and Staffordshire, England; in Würtemberg and Prussian Saxony; and in northern Italy. Russia is almost the only country which derives much from salt lakes. France, Spain, Portugal, and Italy, with a number of the islands of the Mediterranean, are the principal producers of sea salt. England, Austria, France, Spain, Portugal, and Italy, with some of the Mediterranean islands, are the principal exporters of salt.—In Russia the supplies from mines, springs, and lakes are inexhaustible. Over the vast area of the Permian group, covering upward of 300,000 sq. m., salt is found, and

in numerous localities is extensively and profitably worked. Ancient mines of rock salt have been explored in the Caucasus, supposed to be among the oldest in the world. In Sweden, Carlstad near the N. shore of Lake Wener produces some salt, but both Sweden and Norway import much, principally from England and Sardinia. Denmark is also a large importer. In Holland and Belgium refined salt is made from British rock salt, which is dissolved in fresh or sea water, and crystallized by artificial heat. Among the largest salt mines in the world are those of Stassfurt in Prussia, and the adjoining Anhalt mines.—In the Austrian empire, Upper Austria, Salzburg, Styria, and Tyrol on the west, and Croatia and Dalmatia on the south, have almost inexhaustible stores of rock salt and brine springs; while the province of Istria derives much wealth from the lagoons bordering the Adriatic. The salt mines of Wieliczka, 7 m. S. E. of Cracow, extend over a space of about 2 m. in length by nearly 1 m. in breadth, and are about 1,000 ft. in depth. The salt occurs in great lenticular masses, inclined at a high angle. It varies very much in quality; the so-called "green salt" contains 5 or 6 per cent. of clay, which destroys its transparency; a variety called *szpica* is crystalline and mixed with sand; while that known as *szymbik*, principally from the lower levels, is in largely crystallized masses, perfectly pure and transparent. The strata in which it occurs are compact tertiary clays, containing fossils; and the principal associated minerals, besides gypsum, are bitumen, anhydrous sulphate of lime, the sulphates of baryta and strontia, and sulphur. The mines are entered by numerous shafts, with galleries at seven different levels, leading to a labyrinth of passages and immense excavations extending to a total length of upward of 500 m. Some of the chambers formerly excavated were more than 150 ft. high, but those now made are much smaller. One of these is fitted up as a chapel dedicated to St. Anthony, in which the altar, statues, columns, pulpit, &c., are all of salt. In another part is a lake 650 ft. long and 40 ft. deep, formed by the water which trickles through the strata. The annual yield is now about 1,400,000 cwt. It is not known when these mines were discovered. They are believed by recent authorities to have been worked in the early part of the 11th century, when they belonged to Poland, and in the 14th Casimir the Great established regulations for their working, as they had then become very productive. They were pledged to Austria in 1656, but recovered by John Sobieski in 1683. In 1772, when the first dismemberment of Poland took place, Austria again obtained them, and, except from 1809 to 1815, has since held them. The kings of Poland drew considerable revenues from these mines, and depended upon them for the dowries of their queens and the endowments of their convents, to which last purpose their revenues were applied as early as the

14th century. At each royal election the nobles always stipulated that the salt of Wieliczka should be supplied to them at the mere cost of extraction. From Wieliczka a saliferous region extends on both sides of the Carpathians, through Galicia, Hungary, and Transylvania, into Wallachia and Moldavia. The richest mines of Hungary are in the county of Máramaros. In Transylvania the mines have been worked since the times of the ancient Romans, and there is also a large number of salt springs.—In Switzerland the brine springs of Bex have been worked since the middle of the 16th century. They formerly belonged to a family of Augsburg named Zobel, but are now the property of the government of the canton (Vaud). In 1823, in consequence of the gradual failure of the springs, the mountain was pierced by a gallery, which led into a vein or dike of salt, varying from 2 to 50 ft. in thickness. Springs are found in other parts of Switzerland.—In Italy the lagoons and springs, still highly productive, were worked in ancient times. Venice formerly owed her prosperity in great part to her salt lagoons and her control of the trade in salt in southern Europe. During the decline of her power her salines remained unproductive, until they were reestablished on a vast scale during the French rule. They are again largely worked in the artificial enclosures around the city connected with the sea. Salt is a strict government monopoly, and the springs and salines furnish one of the chief articles of export.—Spain has one of the most remarkable salt mines in Europe, at Cardona in Catalonia. Here is a hill 500 ft. high, covering an area of three quarters of a square mile, composed of nearly vertical beds of salt, gypsum, and clay belonging to the cretaceous series, the salt constituting about four fifths of the entire mass. The workings are in the form of long steps of one metre (39 in.) in height and width, cut in the salt, in the open air, by means of blasting and the pick. The salt is simply ground and washed to prepare it for sale. Salt springs are found in other parts of Catalonia and along the Pyrenees, in beds of the same age, as at Pamplona in Navarre. But most of the salt of Spain is obtained from sea water, especially in Valencia and Catalonia. Salt is a strict monopoly in Spain, and can be sold by individuals only for exportation.—In Portugal salt is manufactured principally from sea water, and the business is largely carried on, sustaining a considerable export and coasting trade. The St. Ubes salt, well known in commerce, and much esteemed for packing provisions, is a product of Portugal. The export, and that of the Cape Verd islands also, is principally to Brazil and the United States.—In France, which by the treaty of 1871 has lost its principal rock salt deposits of Vic and Dieuze, formerly comprised in the department of Meurthe, there are both important deposits and springs in the adjoining regions, along the Jura, and in

the central departments. Along the Pyrenees rock salt and springs are found in the cretaceous formation. But the greatest portion of the product of France is from the lagoons on the Atlantic and Mediterranean coasts.—England, which now produces more salt than any other country, obtains her supply almost exclusively from mines and springs in beds of the same geological age as those of Vic and Dieuze, principally in Cheshire and Worcestershire; there are also brine springs in Staffordshire, from which Hull is supplied. Northwich and Winsford in Cheshire, on the river Weaver, furnish six sevenths of the whole; and the beds of rock salt are chiefly limited to the region drained by this river. They occur in detached masses of limited area beneath the plains of this district, sometimes spreading out, as at Northwich, to a breadth of three fourths of a mile. The strata penetrated at this locality are gypsiferous clays and marls to the depth of 120 ft., below which are found beds of salt 60 to 90 ft. thick, resting on 30 to 40 ft. of indurated clays containing seams of rock salt, and below these rock salt about 100 ft. thick. The purest salt is in a portion of 4 ft. thickness about 10 or 12 ft. above the bottom of the upper bed, and in another of 20 ft. thickness 60 or 70 ft. below the top of the lower bed. Other portions of the beds are earthy. The salt is not stratified, but divided into vertical prisms sometimes 3 ft. in diameter. But the Cheshire salt, known in commerce as Liverpool salt, is mostly obtained from wells of 200 to 250 ft. depth, terminating in the lower bed of rock salt. In these the brine is pumped up and conveyed to the evaporating pans, which are 20 ft. wide, 30 to 80 ft. long, and 16 to 20 in. deep. In Scotland, before the abolition of the duty, much salt was made from sea water, but most of the salt works are now abandoned. In Ireland two beds of rock salt, making together a thickness of 120 ft., covered by 630 ft. of red marls, were discovered about 1853 at Carrickfergus near Belfast; since which time the annual product has gradually increased to many thousands of tons.—The total product of the mines and springs of Europe was estimated in 1821 at 1,250,000 to 1,500,000 tons. It is now certainly twice as great as the larger of these estimates; and with the addition of that from sea water and salt lakes, the total product is probably 5,000,000 tons.—In Asia salt is no less abundant than in Europe. In Siberia and Tartary plains are covered with saline incrustations. Extensive mines of rock salt have been worked from ancient times at Nakhitchevan in Armenia. This variety abounds in Persia, where are also many salt lakes with no outlets. Lake Urumiah, 90 m. long and 20 to 30 m. broad, and about 4,300 ft. above the sea, contains brine of extraordinary strength, the percentage of pure salt being 18.116 and of other salts 2.434. Its specific gravity is 1.155. In summer, over a breadth of 3 or 4 m. around parts of this lake, the incrustation of salt is

sometimes more than a foot thick. The resources of British India in salt are great, but comparatively unimportant from the monopoly of the government, and salt is largely imported from England. Still vast beds of rock salt are worked in the Punjab at the foot of the Himalaya, and great quantities are obtained from the incrustations over the plains near the mouth of the Indus, and from various other portions of the Indian peninsula. The salt wells of China are remarkable for their great depth and immense numbers. China and Java are wholly dependent upon their own resources for salt, admitting no importations.—Africa contains extensive tracts of salt lands and beds of rock salt in the desert of Sahara, particularly in the N. and W. portions, as in that part called Tanezruft, on the route between Tuat and Timbuctoo. The trade in salt with Soodan furnishes a support for many of the inhabitants of the desert. Near Biskra is a mountain of salt in the cretaceous formation; and another is found near the salt lake Zagrez. This lake is in some seasons covered with a glistening white crust of excellent salt, like ice, amounting to even one or two feet in thickness. Similar lakes are met with in this region, and also in Abyssinia. In central Africa, salt from salt lakes is perhaps the most important article of commerce.—In the Hawaiian islands salt is procured from the lakes near Honolulu, and is exported.—In South America, rock salt is found in Brazil, Peru, Colombia, and Venezuela; in the pampas of the south and the elevated plains of Peru, it occurs as an incrustation; in Patagonia and the Argentine Republic are productive salt lakes; in Colombia it is obtained from springs, and in Brazil from lagoons on the coast. The salines or salt lakes of the pampas extend from Port St. Julian in Patagonia, lat. 49° S., through the Argentine Republic, to lat. 25° S. They are generally shallow, and in the wet season the whole or a part of the salt is dissolved, and redeposited during the dry season, when the appearance of the snow-white expanse, crystallized in great cubes, is very striking. Patagonian salt is still a large article of commerce with other parts of South America. It is of the greatest purity, requiring no preparation, and containing only 0.26 per cent. of gypsum and 0.22 of earthy matter, without a trace of iodic salts. The beds of various salts in the elevated plains of Tarapaca in Peru, especially around Iquique, are among the most remarkable in the world. The porphyritic mountains on the coast rise abruptly to a height of between 1,900 and 3,000 ft.; between their summits and an inland plain, on which lies the celebrated deposit of nitrate of soda, is a high undulatory district, covered by a crust chiefly composed of common salt, either in white, hard, opaque nodules, or mingled with sand, forming a compact sandstone. This never attains a great thickness, though in the pampa of Tamarugal, in S. Peru, Mr. J. H. Blake

saw a considerable space covered with round masses of salt, 5 or 6 ft. in diameter, piled upon each other. In some places they were deep red, but in the vicinity of Pisco they were sufficiently pure for culinary purposes. The inhabitants employed them in building their houses. As rain falls here only at intervals of many years, the deposits are subjected to very little waste. Colombia has very rich mines of rock salt, especially in the district of Zipaquirá. The mineral extends many miles across a branch of the Cordillera. Salt springs are also found here. On the N. coast are lagoons of great capacity of production. The salt mines of Araya, in the peninsula N. of Cumaná in Venezuela, were discovered by the followers of Columbus in 1499; and as they offered an inexhaustible supply of the finest salt, they continued for years to attract adventurers of all nations. The Dutch islands of Curaçoa and Buen Ayre, N. of Venezuela, produce several hundred thousand barrels annually by natural evaporation and of the finest quality, much of which is exported to the United States.—A large number of the West India islands produce salt, especially the southern Bahamas, Cuba, Porto Rico, St. Martin, and St. Christopher or St. Kitts. Turk's island, S. E. of the Bahamas, was formerly the main source of sea salt for the United States, and even now most of the salt from any of the West India islands, or from Yucatan, is called Turk's island salt. Since 1833 the manufacture has fallen off here, while it has grown up in the Windward islands and some other British islands. Of the Dutch West Indies, besides Curaçoa and Buen Ayre, St. Martin, in the Leeward islands, produces a great deal from lagoons in the southern part, and it is the principal export of Philipsburg, the Dutch capital. On the N. coast of Cuba are extensive lagoons, from which in dry years large quantities are obtained. In Hayti there is a deposit of rock salt on the S. side of the island, said to form a mountain 6 m. long, $\frac{1}{2}$ m. broad, and 400 to 500 ft. high. The crude salt contains 96.79 per cent. of pure sodium chloride. In Porto Rico are two salines formerly worked by the government, which, as well as the monopoly of the introduction of either Spanish or foreign salt into the island, were sold to private parties in 1851. Cuba and Porto Rico, however, draw most of their supply from Spain, and some from England.—In Central America are many salt springs, and on the Pacific coast large quantities are made from sea water. In Mexico, the state of Oajaca has salines extending for 30 or 40 leagues along the Pacific, which are very valuable and supply the whole interior of the state. These formerly belonged to the government, but were sold by Santa Anna to the family of Echeverría for \$300,000. In Tamaulipas salt is produced from a chain of lagoons on the coast divided by the Rio Grande from the celebrated salt lake near Brownsville in Texas.

The lake of Tezcuco, near the city of Mexico, is so strongly impregnated as to leave a white deposit on its banks, and supplies a number of salt works. The island of Carmen, in the gulf of California, contains a large salt lake, with a solid crust several feet thick. Large quantities are sent to Mazatlan and San Francisco.—In British North America, Nova Scotia, New Brunswick, Cape Breton island, Newfoundland, and the Magdalen islands contain salt springs, which in nearly all these places are associated with gypsum. At Goderich on Lake Huron, in 1866, in boring for oil, a deposit of rock salt was struck at a depth of about 960 ft., and the brine was remarkably strong and of great purity. The manufacture of salt was commenced immediately, and developed rapidly, until now the production amounts to several millions of bushels annually, affording the principal source of supply for Canada, and also furnishing a large amount for export to the United States. On account of the strength and purity of the brines, salt is produced and sold at a price which after adding the duty enables the Goderich manufacturers to compete with those of the middle and western states. Canada was formerly principally supplied from England and the state of New York; she has been indeed our only customer of importance, the exports of American salt to other countries being small.—The United States is well supplied with salt, 23 of the states and territories having been returned by the different censuses since 1810 as producers, while seven others possess valuable springs or deposits. Rock salt has been found only in S. W. Virginia and in Louisiana. The principal springs are in central New York, near Syracuse, in West Virginia and Pennsylvania, in Michigan, and in the states bordering on the Ohio. Salt lakes occur in California, Utah, New Mexico, Texas, and Minnesota. Salt has been made from sea water in nearly every Atlantic state at some period. The New England states have at different times produced large quantities of sea salt, particularly during the revolution and the war of 1812, and about 1830; since which time but little has been made, though a few vats are still kept in operation at Cape Cod, Nahant, &c. Virginia had salt works at Cape Charles before 1620, and in 1633 exported salt to Massachusetts. In South Carolina, Nathaniel Johnson undertook the manufacture in 1689, and in 1725 the legislature passed two acts for the encouragement of salt making.—The salt springs of New York are principally in Onondaga co., in the towns of Syracuse, Salina, and Geddes, and issue from rocks of upper Silurian age. They were known to the Indians at a very early period, but Father Lalemant is believed to have been the first white man who visited them. About 1770 Onondaga salt was in common use among the Delawares, and was carried to Quebec for sale. The first made by the whites was in 1788, near Syracuse, by boiling. The salines

belong to the state, which supplies the brine to manufacturers and receives a royalty of one cent a bushel. Six cents was formerly charged, and the state thus derived a large revenue; but in 1846 the tax was reduced to its present amount, which suffices to defray the expenses of pumping, superintendence, &c. In 1789-'90, 500 or 600 bushels were made and sold at \$1 a bushel. In 1791 the capacity of the works was 8,000 bushels a year. In 1797, when the first leases of salt lots were made, the product was 25,474 bushels; in 1807, 165,448; in 1817, 448,665; in 1827, 983,410; in 1837, 2,161,287; in 1847, 3,951,351; and in 1858, 7,033,219 bushels. In 1862 the production reached the maximum of 9,053,874 bushels; since that year the average has been about 8,000,000 bushels, gradually declining since 1870. For 1874 the product was 6,594,191 bushels. The productive springs are in great part found in the marshy lands which surround Onondaga lake. A stratum of marl 3 to 12 ft. thick, underlaid by a marly clay, forms an impervious barrier between the water raised from the wells and that of the lake. Wells are sunk or bored in the low lands around the lake, from 200 to 300 ft., and from these the salt water is forced up by pumps into the reservoirs from which the evaporating works are supplied. The strata passed through near the surface are beds of fine sand, and then clay, sometimes more than 40 ft. thick, beneath which is gravel of pebbles and sand containing salt water. The brine is of variable strength in the different wells, as indicated by its specific gravity, which is from 1.045 to 1.147, and from 30 to 45 gallons are required for a bushel of dry salt weighing 56 lbs. The chief impurity is sulphate of lime, which was found by Dr. Lewis C. Beck to amount to from 4.04 to 5.69 per cent. Excepting the chloride of magnesium, the impurities found in these brines are also common to rock salt. From the deepest wells at Syracuse Dr. Beck obtained brines which afforded 173.50 parts of salt in 1,000 parts, and of which 33½ gallons were required to the bushel of ordinarily dry salt. The deepest wells now afford brines containing 17 to 20 per cent. of salt. Salt springs are found in other parts of central and also of western New York, especially over the area extending E. and W. 170 m. from Otsego co. to Orleans and Genesee, and N. and S. about 80 m. from Broome co. nearly to Lake Ontario.—In western Pennsylvania is an important salt region along the Alleghany, Kiskiminetas, and Beaver rivers, in the carboniferous series. In 1812 the first wells were bored 200 ft. deep on the Kiskiminetas river, and in 1829 there were extensive works there, using coal, and producing salt at 20 to 25 cts. a bushel, while in Kentucky, Ohio, and Illinois it was selling at 50 cts. The production of Pennsylvania in 1857 was estimated at 900,000 bushels; in 1860 it was 1,011,800 bushels, but it has since declined. West Virginia has very important

salines in the valley of the Great Kanawha, beginning at Charleston and extending about 20 m. above. They are situated in the lower coal measures. The first wells bored were only 30 ft. deep, but some have since been bored 1,500 ft.; 700 or 800 ft. is as great a depth as is generally profitable, as below this the water does not increase, while the discharge of carburetted hydrogen gas becomes much more copious. This gas was formerly employed for heating the kettles, but its use is now almost discontinued. The bitter or residual liquor contains a good deal of bromine. In 1829 these works produced 1,000,000 bushels. The product for 1870 was 4,633,750 bushels, but for 1875 it was expected to amount to hardly one fourth of that quantity. In S. W. Virginia there is a salt region, in Washington and Smyth counties, along the banks of the N. fork of the Holston river. The Holston springs and rock salt are on the line of an extensive dislocation of the strata, bringing the lower Silurian magnesian limestones into immediate contact with the lower carboniferous strata, the vertical displacement being calculated by Prof. Rogers at not less than 8,000 ft. The dislocation is at least 100 m. long, but no rock salt or workable brine is found except in the Preston valley, on the line of Smyth and Washington counties. Several productive wells have been bored to the depth of 200 to 300 ft. In one well over 300 ft. of rock salt divided by a little clay was passed through without tapping any brine. There appears to be no solid rock, but a deposit of clay and earth, imbedding in places large bodies of rock salt and gypsum, and saturated in its lower portions with highly concentrated brine. —The first attempts in Ohio were made in 1798 at the "old Scioto salt works" in Jackson co. The wells were only 30 ft. deep, and 600 to 800 gallons were required to make a bushel of dark and inferior salt, which however sold for \$3 or \$4, being carried, even as late as 1808, on pack horses to considerable distances. Until about 1845 the wells were sunk only 400 or 500 ft. in depth, but at Pomeroy they are now 1,200 ft. deep, yielding a copious supply of strong brine, and more than two thirds of the salt of Ohio is at present manufactured in that vicinity. From some of the springs issue large quantities of carburetted hydrogen gas, which has been used as fuel in evaporating. Rock oil is also a product of them. (See PETROLEUM.) In 1850 Ohio produced 550,350 bushels, and in 1873 4,154,187 bushels. Indiana has numerous salt springs, especially along the Wabash river in the coal measures. The Wabash saline in 1809 made 130,000 bushels, and the United States saline, about 1820, at least 150,000 bushels; but in 1870 the whole product of Illinois was only estimated at 54,000 bushels. In Kentucky salt springs or licks are very numerous, and even before 1795 much salt was made. The principal licks are: one on Salt Lick creek, near the Ohio; the upper and

lower Blue springs on Licking river; Drennon's lick, on the Kentucky river; Big Bone, Long, Bullett's, and Mann's licks. The principal works recently in operation are on Goose creek; they made in 1860 about 290,000 bushels, but the product in 1870 was only 64,000 bushels, and is now still less. In Michigan is a valuable salt region in Saginaw co. Many licks and springs have long been known, and in 1838 unsuccessful attempts were made by the state authorities to work some of them. In 1859 the legislature offered a bounty of 10 cts. a bushel for salt made in the state, and a company in E. Saginaw bored a well, and obtained at 669 ft. nearly saturated brine. Since 1860 the production of salt in Michigan has developed with great rapidity, until it has become next to New York the largest salt-producing state in the Union. The product in 1874 was 5,134,875 bushels. In 1862 a deposit of rock salt was discovered on the island of Petite Anse in Vermilion bay, off the coast of Louisiana. It is considered to be geologically more recent than the tertiary, or of quaternary age. It was worked extensively during the blockade of that coast in the civil war, and has since produced more than 100,000 bushels annually. In Kansas, the Indian territory, and western Arkansas, along the Arkansas and Washita rivers, in N. W. Texas, New Mexico, and Utah, is a vast expanse of sterile plains, principally occupied by cretaceous rocks, in nearly every part of which salt lakes and incrustations and vast masses of gypsum occur. But the most famous of these lakes is the Great Salt lake of Utah, about 75 m. long and 30 m. wide, whose waters are nearly saturated, containing 20·2 per cent. of common salt, and 2 per cent. of other salts. For several years the waters in this lake have gradually risen above their former level, and a proportionate diminution of salt has been observed. In California are numerous salt lakes, particularly in Tulare co., at the Canada de las Uvas, and in the Taheechaypah pass of the Sierra Nevada, near which is a dry lake from which a considerable quantity fit for table use has been taken.—At the present time (1875) the production of salt in the United States may be considered in reference to three different sections, viz.: the region east of the Mississippi river, the Rocky mountain region, and the Pacific coast region. Although during the past 100 years salt has been manufactured in nearly every state east of the Mississippi river, the business is now mainly restricted to three separate areas: the neighborhood of Syracuse, N. Y.; Saginaw valley, Mich.; and the Kanawha valley, including the wells at Pomeroy, near the junction of that river with the Ohio. These three localities produced in 1870, in about 200 establishments, nearly 16,000,000 bushels of salt, the total number of establishments in the country at that time being 282, and the total production 17,606,000 bushels. From 1850 to 1875 the salt industry has grown in Florida and Michigan, while in New York

and the Kanawha region it has gradually decreased since 1862, when the business appears to have been most flourishing. In Massachusetts, Pennsylvania, Kentucky, Indiana, and Illinois the business is rapidly becoming unproductive, while Missouri and Tennessee no longer report any saline in actual operation. But the total production for 1870 was greater than that for 1860 by about 5,000,000 bushels, an increase of 40 per cent. The salt industry is now very much depressed, especially in the Kanawha valley and at Syracuse, from the fact that the great strength of the Michigan and Goderich brines and the abundance of fuel in those localities enable these brands of salt to be successfully sold where Onondaga salt made from brines only half as strong, and Ohio and Kanawha salt made from brines still weaker, formerly commanded the market. In addition to these disadvantages, the Onondaga and Kanawha salt is driven from eastern markets by Liverpool salt, which is brought to our eastern seaports at a merely nominal charge by ships that load in return tobacco, cotton, and breadstuffs. Throughout the region lying on both flanks of the Rocky mountains the demand is rapidly increasing, and is mainly supplied from local sources, chiefly brine springs. In 1870 Utah produced 1,950 bushels, Idaho 13,400, Colorado 7,500, and Kansas 10,000. The production is rapidly increasing with the settlement of the country, and is almost without competition. On the Pacific coast salt has long been produced near Los Angeles and further north, and the production increased from 44,000 bushels in 1860 to 174,835 in 1870. The salt is obtained entirely by evaporation of sea water. Salt was formerly produced in Oregon, but is not now manufactured there.—*Manufacture of Salt.* The separation of salt from brines and sea water is conducted in three distinct ways: 1, by evaporation by the heat of the sun in shallow reservoirs, principally practised with sea water in the southern temperate or tropical regions; 2, by artificial heat, in very long shallow pans, as in Cheshire, or in kettles, as at the Onondaga salines; 3, by exposing sea water to intense cold, when the ice formed is nearly pure, and a concentrated brine remains, which is afterward subjected to one of the first two processes. Weak brines are frequently brought to a certain strength by solar evaporation, and then finished by boiling; or more frequently they are pumped up into elevated reservoirs, and suffered to trickle over the surface of bundles of brush or thorns built up into walls, sometimes 30 to 50 ft. high and 5,000 ft. long, fully exposed to the sun and wind; the great amount of surface thus obtained causes the evaporation to go on very rapidly, and a few repetitions of the process bring very weak brines to suitable strength for boiling. This process is known as "graduation;" and the same effect is sometimes obtained by allowing the water to trickle over ranges of cords suspended perpendicularly.

The third process is practised in northern Europe. In nearly every locality certain details are employed in the evaporation due to peculiarities in the brines, in the fuel employed, proximity to the sea, &c. As an illustration of the general methods employed when treating sea water, the operations at Berre near Marseilles are thus described by Dr. T. Sterry Hunt, in a paper published in the "Geological Survey of Canada" for the years 1853-'6. The waters of the Atlantic contain from 2.5 to 2.7 per cent. of common salt, and those of the Mediterranean about 3 per cent. While the latter therefore afford a stronger brine, the dry and hot summers of the southern shores are also more favorable for the evaporation (which is conducted without artificial heat) than the cooler and more rainy coasts of Brittany and La Vendée. The Mediterranean waters, moreover, contain about 0.8 per cent. of sulphates and chlorides of calcium, magnesium, and potassium; and from the residue, or mother liquors, after most of the common salt has been separated, it is found that salts of magnesia and potash and sulphate of soda may be obtained of almost equal value with the salt which is the primary object of the manufacture. The salines of Berre, however, where these operations are very successfully conducted upon a grand scale, do not use the strong sea water, but are supplied from a lake which, though connected with the tide, is freshened fully one half by streams from the interior. Other advantages afforded by the situation compensate for this weakness of the brine. The broad receiving basins of these salines must be so situated that they can be flooded at very high tides, and be protected by dikes against their incursions when supplies of salt water are not wanted. A clayey soil is important to prevent infiltration, and give strength to the dikes. The water being let into the great shallow basins, it is allowed to remain till it deposits its sediments and begins to evaporate by the warmth of the sun. It is thence conducted successively through other basins of 10 to 16 in. depth, in which the evaporation goes on, and the lime it contained is deposited as a sulphate. As its bulk decreases smaller shallow basins suffice for holding it after it is separated from the sediments and lime, and in these it is concentrated by continued evaporation to a saturated brine. When this marks 25° Baumé, it is transferred to the salting tables, upon which the crystalline crusts soon collect. Pure salt to the extent of 25 per cent. of the whole product separates between 25° and 26°, and may be kept by itself, the brine in this case being removed to another table. Upon this salt of second quality is deposited to the extent of 60 per cent. of the whole, between 26° and 28.5°; and upon other tables the remainder is collected between the last degree named and 32°. The last product, though somewhat impure and deliquescent from the magnesian salt it contains, is preferred

for salting fish on account of its property of attracting moisture. The mother liquors are run off to be treated for the other salts. From the salting tables the crystallized salt is taken and made up into pyramidal heaps, and during the summer season these are left exposed to the weather. The little rain that falls promotes the purification of the salt by removing the more soluble foreign matters. Nothing more is done to prepare the salt for the market. Its average price is one franc for 100 kilogrammes (220 lbs.). Steam or horse power is employed at these large salines to raise the water from the lower basins into the upper ones; the machines that take up the water are lifting wheels of 8 to 16 ft. diameter. The evaporating surfaces cover 815 acres, of which $\frac{1}{10}$ is devoted to the salting tables. The total annual product of salt is about 44,000,000 lbs. At Baynas, as M. Payen states, the same amount is made with strong sea water on 370 acres.—The relative strength of the various brines employed in the United States and Canada for the manufacture of salt is thus given by Dr. Beck, the figures representing the number of gallons required to the bushel of ordinary dryness:

Sea water, from.....	300 to 350	Montezuma, N. Y. (old wells).....	70
Boon's Lick, Mo.....	450	Muskingum, O.....	50
Conemaugh, Pa.....	300	Montezuma, N. Y. (new well).....	50
Jackson, O.....	213	Onondaga, N. Y. (old wells).....	45
Lockhart's, Miss.....	180	Onondaga, N. Y. (new wells at Syracuse).....	35
St. Catharine's, Ont.....	120		
Zanesville, O.....	95		
Grand river, Ark.....	80		
Kanawha, W. Va.....	75		

At Saginaw, Mich., the proportion is 25 to 30 gallons to a bushel, and at Goderich, Canada, 22. The following description of the methods employed in treating the brines of Onondaga, N. Y., will serve as an illustration of those generally employed elsewhere, especially in Michigan, Ohio, and West Virginia. These brines contain about one half of one per cent. of sulphate of lime, a very small percentage of the chlorides of calcium and magnesium, mere traces of carbonic acid and oxide of iron, and from 16 to 17 per cent. of salt. It is the object of the manufacturers to remove all of the iron, a part of the sulphate of lime, and as much as possible of the chlorides of lime and magnesium. The colorless and clear brine is first pumped into shallow vats, where it remains until the carbonic acid escapes and the iron is deposited as oxide. It is then either evaporated by the sun's heat for "solar salt," or by artificial heat for fine or boiled salt. The first process is conducted in wooden vats protected by movable covers, sheds with sectional movable roofs being generally used. The evaporation is conducted very slowly, and as a consequence the salt appears in very large crystals and is known as "coarse salt." The brine from which the iron has been separated is drawn into a lower set of vats, where it is left until crystals of salt appear on the surface. A considerable amount of sulphate of lime has meantime been deposited. The resulting satu-

rated brine, called "salt pickle," is drawn off from the precipitated gypsum into a third set of vats. Whenever a sufficient amount of salt crystals has accumulated, they are washed in fresh pickle and allowed to drain from perforated wooden troughs, and thence removed to the storehouse. Three crops are produced in a season, the middle crop being the best. This coarse salt is considered best for packing meats and fish, as it dissolves more slowly than fine salt and prevents the meats from being packed too closely. Boiled salt is produced by several methods, of which three are the most important, viz.: the kettle, the pan, and the steam processes. In the first, most frequently employed in this country, from 50 to 60 kettles, having a capacity of from 100 to 120 gallons each, are set in a row and heated by a common flue and fireplace. Two rows are attached to one chimney. The settling tanks and store rooms are arranged along the sides of the kettles, and the whole roofed over. The precipitation of the iron is sometimes hastened by the addition of a small quantity of milk of lime. The clear brine is then drawn into the kettles, when evaporation goes on rapidly and at a higher temperature; consequently a larger proportion of the sulphate of lime separates before saturation than in the solar process. The removal of this precipitate is effected by placing an iron pan upon the bottom of the kettle, provided with an upright handle. The motion of the boiling liquid causes the particles of solid matter to collect in the central portion of the bottom upon the pan. The pan is removed and emptied from time to time until crystals of salt appear, when it is not replaced. The salt which accumulates is well washed in the remaining pickle and placed in baskets suspended over the kettles, when after draining a few hours it is emptied into the store rooms. A state law in New York prescribes that the salt shall be stored two weeks; also that it shall be inspected before being stored, and again when ready for shipment. The pan process is used in this country to some extent, and largely in England. The brine is either saturated cold or in a pan called the "foreheater." It is then transferred to another pan and evaporated, either slowly or rapidly as a coarse or a fine salt is desired. If a very fine grain is desired, the pans are constantly stirred. The pans are of iron, set over flues, and vary in size from 60 to 20 ft. in length and 35 to 13 ft. in width, by 15 to 20 in. in depth. In these pans the evaporation is very rapid; the salt accumulates constantly, and requires to be withdrawn continually. In the steam process the brine freed from iron is drawn into the steam settlers, where it is brought to saturation. These are wooden cisterns about 100 ft. long, 8 ft. wide, and 6 ft. high. They are heated by several four-inch steam pipes, which pass through them from end to end. After the impurities have settled the brine is drawn into grainers, which are of about the same size as the settlers,

but only 12 to 15 in. deep; they are also heated by steam pipes. The salt forms very rapidly, and is lifted and drained and stored before inspection, as in the kettle process. The character of the salt, especially its fineness, depends less on the character of the brine than on the care and rapidity with which the evaporation has been conducted. The practice called "cutting the grain," *i. e.*, adding to the boiling brine traces of glue, resin, soap, &c., has been known and employed for generations; but its use is condemned by the best manufacturers, as it requires very great care to prevent the salt from being injured for dairy and other purposes for which fine salt is most used. Salt of the very finest quality is now manufactured at Onondaga, by the Ohio and Kanawha salt companies, and in Michigan.—*Uses and Statistics.* Salt is the only mineral substance universally employed as an article of food by man and the higher orders of animals. Besides its direct consumption as food, enormous quantities are needed for preserving meats and fish, much is consumed for agricultural purposes and given to cattle and sheep, and a very large amount is used in chemical operations, particularly in the manufacture of soda. This last process alone takes about 48,000 tons annually in France, and a single establishment near Glasgow has used 26,000 tons for the past 20 years. The proportionate consumption of salt in different countries is very variable. In the United States it is estimated at about 50 lbs. annually for each person, in Great Britain at 22, in France at 15 lbs. Animals and many plants will not thrive when totally deprived of salt, though too much acts as a poison. Certain plants which grow at the seaside depend upon it, and are also found inland in the neighborhood of salt mines and lakes. It is employed as a remedy for dyspepsia, and a spoonful of dry salt will sometimes check hæmorrhage of the lungs or hæmorrhage from other causes. In small doses it acts as a stimulant tonic, and in larger ones as a purgative and emetic. It has also been used with good effect in intermittent fever. It is a necessary stimulus in health, quickly passing into the blood and escaping by the kidneys. Its inordinate use induces plethora, increasing the weight and strength of the body. It is sometimes applied as a fomentation in sprains and bruises. Salt-water baths, natural or artificial, are considered stimulating and tonic. Salt is alluded to in many passages of the Bible. All sacrifices offered in the temple were seasoned with it; newborn children were rubbed with it; it is mentioned as one of the things most necessary to life; it is used as a symbol of perpetuity and incorruption, of hospitality (as it still is in the East), and finally of barrenness and sterility, as in sowing the site of a destroyed city with salt. From its necessity salt has in almost all countries been a favorite subject of taxation, and important political re-

sults have sometimes arisen from the extortions practised by the collectors, of which the histories of France and Hindostan furnish examples. In England the excise on salt has long been repealed. In the United States, the states most largely engaged in the manufacture of salt appoint an inspector whose duty is to inspect the salt and brand the packages as first or second quality, as it may have been carefully or carelessly prepared. To support this system of inspection a light tax is levied on all the salt produced. In Michigan the tax is three mills per bushel; in New York it is one cent a bushel, which however pays, in addition to inspectors' salary, the expenses incident to running the wells.—It would be impossible to gather trustworthy statistics of the consumption of salt throughout the world. In 1790 very little was produced in the United States, and 2,337,920 bushels were imported; in 1825 the value of the production was more than \$1,500,000, and the importation was 4,574,202 bushels; in 1850 the production was 9,763,840 bushels; in 1860, 12,717,193 bushels were produced and 14,094,227 bushels imported; in 1870 the production was 17,606,105 bushels. At present (1875), while our total production has fallen off to some extent, our imports have increased, particularly from Canada, and our total yearly consumption is probably not far from 30,000,000 bushels.

SALTA. I. A N. W. province of the Argentine Republic, bordering on Bolivia and the provinces of Jujuy, Santiago, Tucuman, and Catamarca; area, 50,000 sq. m.; pop. in 1869, 85,959. It is traversed in almost every direction by spurs of the Andes, the flattened crests of which form in the west and northwest a series of plateaus, some as high as 12,000 ft. above the sea, with peaks rising much higher. Among the numerous rivers are the Juramento, San Francisco, and Bermejo, the last forming the boundary with the Gran Chaco. The soil is fertile, and wheat, barley, maize, cotton, coca, coffee, yerba maté or Paraguay tea, and excellent wines are produced. The great forests yield many kinds of valuable wood. Gold, silver, copper, and iron are found, and porcelain clay is abundant. Wine, rum, sugar and molasses, dried and preserved fruits, and the wool and skins of the vicuña, llama, and alpaca are exported. Salta is divided into 21 departments. II. A city, capital of the province, in the low valley of Chicoana, between two mountain chains, about 820 m. N. W. of Buenos Ayres; pop. in 1869, 11,716. It is regularly laid out, with good streets and neat houses. The public schools were attended in 1869 by 2,885 pupils, of whom 1,231 were females. The climate here is less salubrious than almost anywhere else in the province.—This city was founded in 1582 by Abren, under the name of San Clemente de la Nueva Sevilla, in the valley of Siancas; in 1584 it was transferred to its present site, and at first called San Felipe de Lerma.

SALTILLO, a city of Mexico, capital of the state of Coahuila, on the Rio Tigre, 435 m. N. by W. of the city of Mexico; pop. about 15,000. It is well built, but the only edifices worthy of mention are the government house and the parish church. Some silver and gold mines were formerly worked in the vicinity, but none of importance are now in operation. The manufactures comprise cotton stuffs, and *zarapes* much prized for their fineness and brilliant colors. There is an annual fair lasting eight days, largely attended from all parts of the state.—Saltillo was founded in 1586, and incorporated as a city with the name of Leone Vicario, by decree of Nov. 5, 1827. Near it was fought the battle of Buena Vista, Feb. 22 and 23, 1847. (See BUENA VISTA.)

SALT LAKE, a N. county of Utah, bordering on Great Salt lake, and intersected by Jordan river; area, 1,200 sq. m.; pop. in 1870, 18,337. The Wahsatch mountains cross the E. part; the W. portion descends toward the valley of the lake. Along the base of the mountains the soil is productive when irrigated. There are four mining districts, producing gold, silver, and lead in 1874 to the value of more than \$4,000,000. There are smelting works, stamp mills, flouring mills, saw mills, breweries, tanneries, and various manufactories. The county has several railroads. The chief productions in 1870 were 26,838 bushels

of wheat, 6,838 of Indian corn, 4,584 of oats, 4,413 of barley, 16,216 of potatoes, 4,285 lbs. of wool, 16,207 of butter, and 1,172 tons of hay. There were (on farms) 455 horses, 611 milch cows, 1,058 other cattle, 3,184 sheep, and 243 swine. Capital, Salt Lake City.

SALT LAKE CITY, a city, capital of Utah territory and of Salt Lake co., situated at the W. base of a spur of the Wahsatch mountains, 4,320 ft. above the level of the sea, about 12 m. from the S. E. extremity of the Great Salt lake, 2 m. E. of the river Jordan, and 600 m. E. by N. of San Francisco; lat. 40° 46' N., lon. 112° 6' W.; pop. in 1860, 8,236; in 1870, 12,854, of whom 5,250 were foreigners; in 1875, about 20,000, of whom about one third are gentiles and apostate Mormons. It is connected with the Union and Central Pacific railroads at Ogden, 37 m. N., by the Utah Central railroad. The Utah Southern railroad is completed to York, 78 m. S., and the Utah Western 25 m. W. Camp Douglas, a United States military post, is about 3 m. distant. Great care was displayed in selecting the site and in laying out the city. The streets are 128 ft. wide, and cross each other at right angles. There are 260 blocks, each one eighth of a mile square and containing 10 acres. Each block is divided into 8 lots, 10 by 20 rods, and containing 1½ acre. Several of the blocks have been cut by cross streets laid out since the



Salt Lake City, showing the Tabernacle.

founding of the city. Shade trees and ditches filled with running water, brought from City creek for the purpose of irrigation, line both sides of every street, while almost every lot has an orchard of pear, apricot, plum, peach, and apple trees. The city is divided into 20

wards, nearly every one of which has a public square. The dwellings and business structures are built principally of adobe. The former are generally small and of one story, with separate entrances where the proprietor has a plurality of wives. Among the public build-

ings are the city hall, costing \$70,000, used as the territorial capitol; the tabernacle, capable of seating about 15,000 persons, covered by a self-supporting roof; and the Mormon temple, in course of construction, estimated to cost \$10,000,000. The theatre is very large. The government is vested in a mayor and common council, but they are really controlled by the president of the Mormon church. Recently 5 m. of street railroad have been built and gas works have been put in operation. The laying of about 5 m. of water pipes is in progress (1875). The city contains two national banks, a savings institution, and three private banks. There are no public schools, but many good private ones. The principal institutions of learning are the university of Deseret (Mormon), St. Mark's school (Episcopal), a Roman Catholic nunnery, and the Methodist and Presbyterian schools. There is a public library, under the auspices of the ladies of the city. Three daily (two Mormon and one gentile) and five weekly (two Scandinavian) newspapers and two monthly periodicals (devoted to religion and education) are published. A miners' hospital is supported mainly by the mining camp near the city. There are about 30 churches, of which all but 6 are Mormon. Salt Lake City was settled in 1847 by the Mormons, under the lead of Brigham Young.

SALTPETRE. See NITRATES.

SALTS. In the present state of chemical science a satisfactory definition of the term salt cannot be given. The older chemists regarded a salt as a product of the "union" of an acid with a base, as when (using the older notation, as well as atomic weights) nitric acid (NO_3) unites with potash (KO) to form nitrate of potash (KO, NO_3); and this definition is often used at the present time, but according to modern theory it is not strictly correct. To say that a salt is produced by the "action" of an acid on a base is correct as far as it goes, but salts are sometimes formed by the direct union of two elements, neither of which is an acid or a base. By the term base is meant a body composed of two or more elements (inorganic bases usually having only two), most frequently an oxide of a metal, which is capable of effecting a double decomposition with an acid, during which water and a salt are formed by the exchange of elements, as when oxide of silver is acted upon by nitric acid ($\text{Ag}_2\text{O} + 2\text{HNO}_3 = 2\text{AgNO}_3 + \text{H}_2\text{O}$), where the oxygen of the oxide of silver unites with the hydrogen of the nitric acid to form water, while the metallic basyle silver unites with the radical (NO_3) to form nitrate of silver. This is a different action from that formerly supposed to take place, that is, the direct union of the base and acid, without double decomposition; for instance, using the old notation and equivalent numbers, $\text{AgO} + \text{NO}_3 = \text{AgO}, \text{NO}_3$. That part of the base which unites with a portion of the acid to form the salt is usually called the basyle. In the formation of

nitrate of silver above described, the basyle Ag of the base Ag_2O displaces the hydrogen which in the nitric acid is united with the radical NO_3 . Lavoisier supposed that all true acids contained oxygen, and gave the name (meaning acid generator) to that element in accordance with that hypothesis. The term acid was applied to both the anhydrides and their compounds with water, which latter are now regarded as the only true acids. In course of time it was discovered that there were acids containing no oxygen, such as hydrochloric, hydriodic, and hydrobromic acids, which possessed all the other characteristics of Lavoisier's acids, as sourness to the taste and the power to redden vegetable blues. This led to the division into oxyacids and hydracids; but it was found that the constitution of common salt was simply binary, it being composed of the metallic basyle sodium united to the element chlorine, and having the formula NaCl . Berzelius then propounded the theory that a salt consisted of an electro-positive body united to an electro-negative body, each of which might be either simple or compound. When simple, as in common salt, they formed haloid salts, so named from their resemblance to common salt (Gr. $\alpha\lambda\varsigma$, sea salt), and consisted of an electro-positive metal united to an electro-negative radical or halogen. When these bodies were compound they formed amphide salts, and these amphide salts might contain oxygen in both base and acid, or they might contain sulphur in both; in one case being called oxy-salts, and in the other sulpho-salts. The haloid salts were strictly binary compounds, but the amphide salts were regarded as ternary. Davy and Dulong also introduced a theory by which the seeming difference between oxyacid and hydracid salts was reconciled. This was called the binary theory, and it regarded all hydrated acids as in reality salts, containing hydrogen in place of a metal, and acting the part of a basyle toward a single element or group of elements, and all salts as being built up on the type of chloride of sodium. Thus sulphuric acid, H_2SO_4 , may be regarded as a salt similar in constitution to potassic sulphate, K_2SO_4 , the only difference being the presence of the feeble basyle hydrogen in place of the powerful basyle potassium. By the action of sulphuric acid on zinc there is simply displacement of hydrogen by zinc ($\text{H}_2\text{SO}_4 + \text{Zn} = \text{ZnSO}_4 + 2\text{H}$), hydrogen being evolved in a gaseous state. According to the old ideas, using the old notation, sulphuric acid, $\text{H}_2\text{O}, \text{SO}_3$, acting on the zinc, caused electric polarization, by which the affinity of the metal for oxygen was so increased that it rapidly decomposed water, liberating the hydrogen, forming a base, ZnO , with the oxygen, and then uniting with the anhydride SO_3 , forming sulphate of zinc, ZnO, SO_3 . The binary theory, it will be observed, simplifies the reactions, at the same time that it admits of the agency of the electro-motive force; for in the composition of

sulphate of zinc, ZnSO_4 , the metal is regarded as an electro-positive basyle, while the body SO_4 is regarded as an electro-negative radical, composed of the anhydride of the acid plus oxygen, and called generically an oxion. When the oxygen is united to sulphur, as in sulphuric acid, the oxion is specifically called a sulphion, or sometimes an oxysulphion. In the case of sulphurous acid, instead of being a sulphion it is a sulphosion. When the radical contains nitrogen instead of sulphur, it is an oxion, which is specifically called a nitron or a nitrosion, according as it is a constituent of nitric or nitrous acid. The objections to the binary hypothesis are, that none of the compound radicals or oxions, SO_4 , NO_3 , or CO_3 , have ever been isolated; and it also appears improbable that a compound which is held together by such powerful attractions as in potash exist between potassium, the most highly electro-positive, and oxygen, the most highly electro-negative element, should be decomposed by the action of carbonic anhydride, CO_2 , parting with its oxygen, so that $\text{K}_2\text{O} + \text{CO}_2$ should become K_2CO_3 instead of $\text{K}_2\text{O} \cdot \text{CO}_2$. Chemists are now more inclined to regard a salt, when once formed, as a whole, and not as consisting of two distinct parts, although it is probable that during the act of combining the electro-chemical relations of the constituents are distinct and opposite. It is sometimes convenient, however, to regard salts as having the constitution of binary compounds, and as consisting of a basyle and a radical constantly held together by opposite electric polarities. It was formerly supposed that salts are formed only between acids and bases of the same class; that is, that both members must be oxides, sulphides, chlorides, &c.; and this was consistent with the ternary hypothesis, which regarded the salt as a combination of a compound base with an anhydride and not with its radical, as has been above illustrated. Upon this hypothesis it will be seen that sulphuret of potassium could not form a salt with sulphuric acid. It required decomposition to effect this, including the evolution of sulphuretted hydrogen gas, thus: $\text{K}_2\text{S} + \text{H}_2\text{SO}_4 = \text{K}_2\text{SO}_4 + \text{H}_2\text{S}$. But according to the binary theory a similar reaction takes place on the addition of sulphuric acid to oxide of potassium, water instead of sulphuretted hydrogen being formed: $\text{K}_2\text{O} + \text{H}_2\text{SO}_4 = \text{K}_2\text{SO}_4 + \text{H}_2\text{O}$.—There are three varieties of salts which depend upon the relative proportions of radical to basyle, or, in common language, of acid to base. They are called neutral or normal, acid, and basic or subsalts. 1. *Neutral Salts*. A salt is commonly said to be neutral when the characteristics of both acid and base have neutralized each other, and this condition is usually regarded as existing when the salt has neither the effects of acids nor alkalies upon certain vegetable colors. The blue color of litmus is changed to red by an acid, and again restored by an alkali, while a perfectly neutral

salt produces neither of these effects. The yellow of turmeric is turned brown by an alkali, and is restored by an acid. But there are some salts which are regarded as neutral in composition, or, to use a more appropriate term, normal, which have the power of changing vegetable blues to red, and *vice versa*. There are some acids (and they are all now regarded as salts of hydrogen) that contain only one atom of hydrogen which can be displaced by one atom of a monad metal. Such acids are said to be monobasic, and among them are hydrochloric, HCl , nitric, HNO_3 , and acetic, $\text{HC}_2\text{H}_3\text{O}_2$. When these acids unite with bases, they are capable of forming only monobasic salts, that is, salts containing one atom of basyle. Other acids contain two atoms of hydrogen, which may be replaced by two atoms of a monad metal like potassium, or one equivalent of a dyad like zinc. These acids are called dibasic, and among them are sulphuric, H_2SO_4 , and tartaric, $\text{H}_2\text{C}_4\text{H}_4\text{O}_6$. Other acids again contain three atoms of hydrogen, which may be replaced by three atoms of a monad metal, or one atom of a triad; and such acids are said to be tribasic, of which tribasic phosphoric acid, H_3PO_4 , and citric acid, $\text{H}_3\text{C}_6\text{H}_7\text{O}_7$, are examples. Acids and salts which contain more than one equivalent of basyle are said to be polybasic. In general it may be said that when all the atoms in the hydrogen basyle of the acid are, in the formation of the salt, replaced by an equivalent number of atoms of the metallic basyle, the salt as formed will be normal, or, in common language, neutral; although it must be remembered that some normal salts will change vegetable colors. 2. *Acid Salts*. When the atoms of the hydrogen basyle are only partially replaced by a metallic basyle, the salt so formed is an acid salt, the acid character of the hydrogen compound (acid or salt) not having been neutralized by an equivalent of metallic basyle. The formation of a true acid salt therefore requires a polybasic acid, for if the one basyle of hydrogen in an acid is replaced by one metallic basyle, the salt so formed will be normal. An example of an acid salt is bisulphate of potassium (hydric-potassic sulphate), KHSO_4 , where only half of the basyle hydrogen is displaced, and there is only one atom of potassium instead of the two which are required to replace the hydrogen in sulphuric acid, H_2SO_4 . Other examples are the organic salts, bitartrate of potassium (cream of tartar, hydric-potassic tartrate), $\text{KHC}_4\text{H}_4\text{O}_6$, and bicarbonate of potassium (hydric-potassic carbonate), KHCO_3 . The normal salts corresponding to these are: potassic sulphate, K_2SO_4 ; potassic tartrate, $\text{K}_2\text{C}_4\text{H}_4\text{O}_6$; and potassic carbonate, K_2CO_3 . 3. *Basic Salts*. These are such as contain a greater number of atoms of metallic basyle than there were atoms of hydrogen basyle in the acid. An example of such salts is basic mercuric sulphate (turpeth mineral), $\text{HgSO}_4 \cdot 2\text{HgO}$, which contains three atoms of mercury in

place of the two atoms of hydrogen that were contained in the sulphuric acid from which the salt was formed. The theory of the formation of basic salts is imperfect, and it will be observed that here there is not that complete replacement of basyle which exists in neutral and acid salts. The tendency to the formation of basic salts is limited to certain acids and bases. The monad basyles do not form basic salts. The dyad metals, such as copper, lead, and mercury, have a strong tendency to do so, while the triads, as antimony and bismuth, have a still stronger tendency. 4. *Double Salts*. In considering polybasic acids and salts, it was seen that one of the atoms of the hydrogen basyle of a dibasic acid might be replaced by an atom of a monad metallic basyle. Such an acid salt may be regarded as a true double salt of a metal and hydrogen. But a normal double salt may be formed by replacing one half of the hydrogen basyle with one monad metal, and the other half with another monad metal. Such are called double salts, of which Rochelle salt (tartrate of potash and soda), $\text{KNaC}_4\text{H}_4\text{O}_6 + 4\text{Aq}$, is an example. Most of the double salts have this constitution, but others have a different formation. A remarkable class of double salts was investigated by Graham. In many cases the water of crystallization may be expelled from a salt by the temperature of boiling water; in other cases all but one molecule will be thus expelled, which requires a considerably higher heat. It was found that this last molecule of water could be replaced by a molecule of certain anhydrous salts. The formation of a certain class of sulphates illustrates this action. All the sulphates of metals isomorphous with magnesium are capable of forming double salts of this character with some anhydrous sulphate not isomorphous with this class, as potassic sulphate. If magnesian sulphate, $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$, which parts with six of its molecules of water at 212° and crystallizes in right rhombic prisms, and potassic sulphate, K_2SO_4 , which crystallizes in six-sided prisms, or in four-sided right rhombic prisms, are separately dissolved in water in equivalent proportions and mingled while at a temperature a little above 212° , the solution will deposit on cooling a new double salt, $\text{MgSO}_4 \cdot \text{K}_2\text{SO}_4 + 6\text{H}_2\text{O}$, having the same crystalline form as magnesian sulphate, but containing six instead of seven molecules of water of crystallization, potassic sulphate occupying the place of the seventh molecule. This seventh molecule has been termed by Graham saline water. Another well known variety of double salts are the alums, of which common potash alum, $\text{K}_2\text{Cl}_2\text{SO}_4 + 24\text{H}_2\text{O}$ (or $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 + 24\text{H}_2\text{O}$), is an example. (See ALUM.) Haloid salts unite with each other to form double salts, the most common of which are formed by the chlorides, iodides, and bromides of the less oxidizable metals, and the alkaline and earthy metals. Examples of such double haloid salts are the double chloride of potas-

sium and platinum, $2\text{KCl} \cdot \text{PtCl}_4$, and the double iodide of potassium and mercury, $2\text{KI} \cdot \text{HgI}_2$. There is a class of salts called oxychlorides, oxybromides, oxycyanides, &c., in which one molecule of the chloride, of the bromide, or of the cyanide is united with one or more molecules of the oxide of the same metal, as in Turner's yellow, $\text{PbCl}_2 \cdot 7\text{PbO}$.—When any acid is added to the solution of a salt the basyle of which is capable of forming a soluble salt with the radical of such added acid, a partial exchange between the basyle of the salt and the hydrogen basyle of the added acid is supposed to take place, probably in the proportion of the relative attractions of these basyles for each radical. But if the radical of the added acid is capable of forming an insoluble salt with the basyle of the salt, the latter will be entirely decomposed, and its radical appropriated by the radical of the added acid; for as fast as the basic sulphate is formed it is removed from the solution by precipitation, which necessitates a continual decomposition of the first salt: $\text{Ba}_2\text{NO}_3 + \text{H}_2\text{SO}_4 = \text{BaSO}_4 + 2\text{HNO}_3$. Similar reactions take place on adding a base to a saline solution. If both bases and the salts which they form with the radical of the salt are soluble, the solution will remain clear; but if the added base forms an insoluble salt with the radical of the salt, the latter will be decomposed, while the new salt will be precipitated; or if the base of the salt be insoluble while the added base is soluble, a soluble compound will be formed, and the base of the first salt will be precipitated. Most of the metallic salts, with the exception of those of the alkalis and the alkaline earths, are formed from bases which are insoluble in water; consequently the addition of a soluble base, as potash or soda, to such metallic salts causes the precipitation of the base or oxide, and upon this reaction depend many of the chemical tests for metallic substances. Oxide of zinc, or zinc white, although prepared for commerce by distilling zinc into chambers supplied with currents of air, may be formed by precipitation from solutions of its salts by an alkaline hydrate, for instance, from the sulphate by the action of potassic hydrate ($\text{ZnSO}_4 + \text{K}_2\text{O} = \text{ZnO} + \text{K}_2\text{SO}_4$), potassic sulphate being formed and remaining in solution. The nature of the double decomposition which takes place when two salts are brought together depends often upon the condition in which they are. For instance, if ammoniac sulphate and calcic carbonate are mixed together in a dry state and gently heated, decomposition takes place, and calcic sulphate and ammoniac carbonate are produced, the latter being expelled as a volatile product: $\text{CaCO}_3 + (\text{H}_4\text{N})_2\text{SO}_4 = (\text{H}_4\text{N})_2\text{CO}_3 + \text{CaSO}_4$. But if a solution of calcic sulphate and ammoniac carbonate are mixed, the effects will be reversed, and calcic carbonate and ammoniac sulphate will be formed, the former being precipitated, the latter held in solution.

SALTZBURG. See SALZBURG.

SALUTATION, words or signs of greeting.

Among the ancient Greeks the verbal form was *Χαίρε* ("Rejoice"); among the ancient Romans, *Salve, vale* ("Be healthy, be strong"), and *Quid agis?* ("What doest thou?"). The French say: *Comment vous portez vous?* ("How do you carry yourself?"); the Germans: *Wie befinden Sie sich?* ("How do you find yourself?"); the Italians: *Come sta ella?* ("How do you stand?"); the modern Greeks: *Τί κάμνετε* ("What do you do?"); the Dutch: *Hoe vaart gij?* ("How do you fare?"); the Swedes: *Huru mår Ni?* ("How can you?"). One form of salutation in the fevered country of Egypt is: "How goes the perspiration? do you sweat copiously?" In China a common salutation is: "Have you eaten your rice? is your stomach in good order?" and a similar one prevails in Holland in *Smakelijk eten?* ("Have you relished your meal?"). One Polish form is: *Czyś wesół?* ("Art thou gay?"); and another: *Jak się masz?* ("How hast thou thyself?"). Two common salutations in Russia are: *Zdrastvui* ("Be well"), and the peculiar *Kak pozhivayete?* ("How do you live on?"). A common exclamation in Russia, *Boh s toboi*, which means literally "God with thee," has now rather the signification of "Devil take you." The salutations of the Arabs and Turks are marked by a religious character. Among those of the Arabs are: "May your morning be good;" "God grant thee his favors;" "If God will, thou art well;" "If God will, all the members of thy family enjoy good health." The Turks say: "Be under the care of God;" "My prayers are for thee;" "Forget me not in thy prayers;" and "Thy visits are as rare as fine days," an expression evidently of very ancient origin, as it is in no way applicable to their present country. The Persian salutations are marked by extravagant compliment, such as: "Is thy exalted high condition good?" "Peace be upon thee;" "I make prayers for thy greatness;" "May thy shadow not be removed from our head;" and "May thy shadow never be less." An old English salutation in polite society was: "Save you, sir," evidently an abbreviation of "God save you, sir," just as "Good bye" is a contraction of "God be with you."—Of the many different methods of salutation, the custom of shaking hands is the one most common among civilized nations, though probably it comes from the remotest barbarism, when two men meeting gave each other their weapon hands as a security against treachery or sudden attack. On the European continent it is usual for men who are intimate friends to kiss one another; but this custom prevails in England and America only among women. In the greatest portion of Germany it is an act of politeness to kiss the hand of a lady; but this privilege is allowed in Italy only to near relatives, while in Russia it is extended to kissing the forehead. In the East and among the Slavic nations the salutations

partake of the character of self-abasement. The custom of throwing one's self upon the ground and kissing the feet of the monarch prevailed among the Persians. In China, an inferior upon horseback meeting a superior dismounts and waits till the latter has passed by. In Japan the inferior removes his sandals when meeting his superior, crosses his hands by placing the right hand in the left sleeve, and then suffering both to fall slowly on his knee, passes the other with a slow and rocking motion of the body, crying out: *Augh! augh!* ("Do not hurt me!"). In Siam, when the inferior throws himself upon the ground before his superior, the latter sends one of his dependants to examine whether the former has been eating anything or carries with him any smell at all offensive. If such be the case, he is immediately kicked out without ceremony; but if not, the attendant raises him up. In Ceylon the inferior on meeting a superior throws himself on the ground, repeating the name and dignity of the latter, who appears to take scarcely any notice of the prostrate form which he passes. In some countries the salutations are often made by the contact of other parts of the body besides the hands and the lips. In the Society and Friendly islands, two persons on meeting salute by rubbing the ends of their noses together, and the salutation is returned by each taking the hand of the other and rubbing it upon his own nose and mouth. The Moors of Morocco ride at full speed toward a stranger as if they intended to run him down, and as soon as they have approached near they stop suddenly and fire a pistol over his head. In one of the Pelew islands the inhabitants grasp either the hand or the foot of the one they wish to salute, and rub their faces against it. In Burmah, in order to kiss, they apply the mouth and nose closely to the person's cheek and draw in the breath strongly as if smelling a delightful perfume; hence, instead of saying: "Give me a kiss," they say: "Give me a smell." The Arab salutations are very ceremonious. If persons of distinction meet, they embrace several times, kiss each other's cheek, inquire several times about the health of each other, and also kiss their own hands. The Arabian dwellers in the desert shake hands six or eight times, and in Yemen persons of rank permit their fingers to be kissed after a long refusal. In Turkey it is the custom to cross the hands upon the breast and bow to the person saluted. Military salutations consist in the touching of the hat or cap, the lowering of swords or of colors, the presenting of arms, or the firing of cannon. Naval salutes are also made by the discharge of cannon, by the lowering or raising of the flag, and by the cheering of the sailors.

SALUZZO (Fr. *Saluces*), a town of Piedmont, Italy, capital of a circle in the province of Coni, 30 m. S. S. W. of Turin; pop. about 16,000. It contains a cathedral, a gymnasium, and a statue of Silvio Pellico, who was born here.

The old castle, where Griseldis is said to have been imprisoned, has been converted into a penitentiary. Wine, grain, cattle, and ice are dealt in, and there are silk looms, tanneries, and hat manufactories. In the middle ages Saluzzo formed a margraviate, which in the latter part of the 14th century became dependent upon Savoy. In the 16th century its possession was disputed by France and Savoy, but in 1601 Henry IV. gave it up to the latter, receiving a compensation in other territories.

SALVADOR, Joseph, a French historian of Spanish-Jewish extraction, born in Montpellier in 1796. He studied medicine, but did not practise. His principal works are: *Loi de Moïse, ou Système religieux et politique des Hébreux* (1822), a prelude to the *Histoire des institutions de Moïse et du peuple hébreu* (3 vols., 1828); *Jésus-Christ et sa doctrine* (2 vols., 1838); *Histoire de la domination romaine en Judée et de la ruine de Jérusalem* (2 vols., 1846); and *Paris, Rome, Jérusalem, ou la question religieuse au XIX^e siècle* (2 vols., 1859).

SALVAGE, in admiralty, and generally in the law merchant, the compensation earned by persons who voluntarily assist in saving a ship or her cargo from a maritime peril. This compensation is not a mere payment on the principle of a *quantum meruit*, or a remuneration *pro opere et labore*, but a reward for bravely encountering the perils of the seas, given in order that the general interests of navigation and the commerce of the country may be advanced. As to the amount of salvage which shall be decreed, or the proportion in which it shall be given to salvors, there is no fixed rule or practice in admiralty. In respect to derelict or abandoned property, the ancient rule gave one half to the salvor; but now the position seems to be well established that the reward in derelict cases should be governed by the same principles as in other salvage cases, namely, that it shall depend upon the danger to property, value, risk of life, skill, labor, and the duration of the service. The court has no power to decree salvage for saving life merely; but if the saving of life can be connected with the saving of property, then the court will take notice of it. Nevertheless, efforts to save life do not command a compensation so much higher than is given for the saving of property as might perhaps be expected. The reason is, that it is not a deviation when the vessel goes out of her way to save life, and therefore the insurance is not forfeited; whereas it is a deviation to vary from the course for the purpose of saving property, and compensation must be made for forfeiture of the insurance.—It is a cardinal rule that salvage services can be performed only by persons not bound by their legal duty to render them. A crew cannot claim as salvors of their own ship or cargo, not only because it is their duty to save her if possible, but because it would be most unwise to tempt them to let the ship and cargo get into

a position of extreme danger, that then, by extreme exertions, they might claim salvage. But to this general rule there is the exception that, where the contract of the seamen is at an end, or the service rendered is so entirely out of the line of their ordinary duty that it may be considered as not done under their contract, there may be a valid claim for compensation. A crew are bound to suppress a mutiny on board their own ship at all events and at every hazard, and cannot claim salvage therefor. If the crew of one ship suppress mutiny or revolt in another, or retake a captured ship from mutineers or revolters, this may well found a claim for salvage. If part of the crew leave their ship and go to save another, and thereby acquire a claim for salvage, the rest who remain share in the claim, yet not equally, for their right rests mainly on the increased labor, exposure, or peril which falls on them. For ordinary services rendered to the ship in time of distress, no salvage is due to a passenger; but in his case, as in that of a seaman, extraordinary services may give a salvage claim. A pilot, like a passenger, may become a salvor when his peculiar relation to the ship is dissolved; but most of our state pilotage laws make it part of the duty of a pilot to assist vessels in distress, and either give the rate of extra compensation to be awarded, or point out the tribunal which shall determine the amount due. Extra services are, therefore, generally considered in this country as such, and not as salvage services. The officers and crews of our national vessels are so far bound to rescue a vessel from mutineers that they are not entitled to claim any compensation in such a case, unless perhaps when they incur great personal danger, and use great exertions in the performance of the service. For an ordinary salvage service they are entitled to compensation. As a general rule, none can claim salvage who do not directly participate and aid in the salvage services, or at least promote those services by doing the work of those who render them. But an exception, and a liberal one, is usually made in favor of the owners of the saving vessel, who are not only entitled to claim compensation for stores and other supplies and outlays, but salvage compensation in addition.—A salvage service is possible when the peril encountered is something distinctly beyond ordinary danger, something which exposes the property to destruction unless extraordinary assistance be rendered. But if the master can, by proper use of the means in his possession, save the property, the law presumes that he will, and that the salvor's interference was unnecessary; yet even if the master could save the ship, the salvors may show that he would not have done so. It is not necessary that the distress should be actual or immediate, or that the danger should be imminent and absolute; it will be sufficient if, at the time the assistance is rendered, the ship has encountered any damage or

misfortune which might possibly expose her to destruction if the services were not rendered. That the property must be actually saved, and saved by those claiming to be salvors, in order to lay the foundation for salvage claims in admiralty, is quite certain; but if the party encounters the danger, and does all he can to save the vessel, and his services tend in some degree to preserve the vessel, compensation will be awarded to him, although the vessel is mainly preserved by other means. It is equally a salvage service, whether the service be rendered at sea or where the vessel is wrecked on the coast, and whether it be performed by seamen or landsmen. If a vessel at sea is short-handed by reason of sickness, and is navigated into port by a part of the crew of another vessel, that is to be treated as a salvage service. So compensation has been granted for keeping near a vessel in distress at the earnest request of her master and crew, although but little aid was rendered.—Salvage is generally decreed on all the property saved, whether ship, cargo, or freight. It is allowed on public property, and all goods of the government pay the same rate as if they were owned by individuals. The general rule is that our courts have jurisdiction over all property, to whomsoever it belongs, which comes within their territorial jurisdiction; but vessels of war belonging to a foreign neutral power cannot be arrested in our ports into which they have lawfully come, and the same is true of a private armed vessel sailing under a commission from a foreign government. The private property of a foreign sovereign, or the prize property which a vessel of war brings into our ports, comes within the general rule, and not within the exception.—If assistance is rendered to a vessel under circumstances which would generally constitute it a salvage service, it may yet not be such; as where the service is rendered under a custom to give assistance gratuitously in similar instances, or where the aid is given under a special contract. If two vessels sail as consorts and under an agreement to assist each other, neither can claim salvage for assistance rendered to the other. Even when vessels sailing together are not consorts, nor owned by the same party, it is possible that there may be a usage of mutual help which would defeat a claim of salvage. Thus it is said that if a steamer be stranded on a sand bank in the Mississippi, and another steamer draws her off, usage prohibits any salvage compensation. But a custom of one port that vessels shall assist each other gratuitously is not binding on vessels of other ports rendering assistance to vessels of the port where the custom exists. If, at the time of the service, the salvors make a bargain with the owners of the property in peril, or their servants, as to the amount of salvage, this is enforced by the court against the owners only so far as it seems equitable and conformable to the merits of the case.—Any gross misconduct on the part of the

salvors, and especially any embezzlement of the property saved, forfeits their whole claim. The responsibility of the salvors, respecting the preservation and protection of the property, continues as long as the property is subject to the decree of the court. Salvors in possession have a qualified property in the thing saved, whether ship or cargo, or both, and they cannot be divested of this interest until it is taken from them by adjudication. Yet it is not necessary that they should remain in actual possession, in order to maintain their rights or preserve their qualified property; nor should they do so to the detriment of the property or the inconvenience of the master and crew.—Military salvage is that which is earned by rescuing vessels or cargoes from pirates or the public enemy. In cases of recapture, it follows as an incident of prize. The amount of salvage is fixed by statute for most of these cases, and when not so determined must be governed by the general principles of law.

SALVANDY, Narcisse Achille de, count, a French author, born at Condom, June 11, 1795, died in Normandy, Dec. 15, 1856. He enlisted in the imperial guard in 1813, was wounded at the battle of Brienne, and rose to the rank of adjutant major. In 1819-'21 he was master of requests. In 1824 he became connected with the *Journal des Débats*, and assisted Chateaubriand in combating the ultra royalists. In 1835 he was admitted to the academy. He was minister of public instruction in 1837-'9, and again in 1845. In 1843 he was made count and ambassador to Turin. After the *coup d'état* of Dec. 2, 1851, he withdrew to private life. He published *Alonzo, ou l'Espagne* (4 vols., Paris, 1823-'4); *Isaor, ou le Barde chrétien* (1824); and *Histoire de Pologne avant et sous le roi Jean Sobieski* (3 vols., 1827-'9).

SALVATOR ROSA. See ROSA.

SALVI, Giambattista. See SASSOFERRATO.

SALVIA. See SAGE.

SALVINI, Tommaso, an Italian actor, born in Milan, Jan. 1, 1833. At the age of 14 he became a pupil of the actor Gustavo Modena, made his first appearance a year later at the royal theatre in Naples, and subsequently accompanied Ristori in a theatrical tour through Italy. In 1849 he served as a volunteer under Avezzana, and afterward went to Paris, where he appeared in the characters of Orosmane in *Zaire*, Oreste, Saul, and Othello. On his return to Italy, Giacometti wrote for him the drama *La morte civile*. In 1865 he took part in the celebration at Florence of Dante's 600th birthday, reciting portions of the *Divina Commedia*. After another tour through Italy, he played in the chief cities of Spain and Portugal, and in April, 1871, went to South America, filling engagements in Montevideo, Buenos Ayres, and Rio de Janeiro, whence he returned to Italy. In 1873 he came to the United States, making his first appearance Sept. 16, as Othello, in the academy of music in New York, and gave 128 representations, including

Hamlet, the Gladiator, Samson, David Garrick, &c., in the leading American cities, and 28 in Havana, closing with Othello in New York in June, 1874. In 1875 he gave a successful series of performances in London.

SALZACH, or *Salza*. See **SALZBURG**.

SALZBURG. **I.** A duchy and crownland of Austria, bordering on Upper Austria, Styria, Carinthia, Tyrol, and Bavaria; area, 2,767 sq. m.; pop. at the end of 1869, 153,159. It is almost entirely surrounded by Alpine mountains. The Noric Alps extend through the country under various names, and the Gross-Glockner, their highest peak (12,776 ft.), is on the southern border, on the confines of Carinthia and Tyrol. The principal river is the Salzach, an affluent of the Inn, which rises in the S. W. corner, flows E. by N. to the centre of the duchy, and then N. N. W. to the Bavarian frontier. Among other rivers are the Enns and the Mur. The Zeller lake is the largest of the numerous Alpine lakes. The Krimler Ache waterfall is the most imposing in Austria. The principal mineral springs are at Gastein. Hallein, on the Salzach, is noted for its production of salt. The climate is generally cold, but not unhealthful, although there are many cretins in the high mountain region. Salt, copper, iron, lead, and arsenic abound, but the production of precious metals has fallen off. Cattle and horses are plentiful. Hosiery is the principal article of manufacture.—The country formed a part of the Roman province of Noricum, and after the fall of the empire rapidly recovered from the invasion of the barbarians. The duchy owes its origin to a bishopric founded in the 6th century by the Bavarian duke Theodo, with St. Rupert as first incumbent. Considerably enlarged, it was raised in 798 to an archiepiscopal see. The archbishop Gebhard became in 1088 legate for all Germany. His successors were perpetually involved in hostilities with the emperors and other princes and their own subjects. In 1498 Archbishop Leonard II. expelled the Jews and all his enemies among the nobles. In 1731–'2 all the Protestants, numbering about 30,000, were expelled by Archbishop Leopold Anthony for refusing to abjure their faith. Most of them found a hospitable refuge in East Prussia, offered to them by Frederick William I. Previous to its secularization in 1802, the see had a population of nearly 200,000. It was then ceded with other territory to the grand duke Ferdinand of Tuscany, and in 1805 to Austria. By the peace of 1809 it was ceded to Napoleon, who in 1810 gave it to Bavaria. Most of the territory was restored to Austria in 1814. In 1849 it became a separate crownland, and the first Salzburg diet was held in 1861. **II.** A city (anc. *Juvavia* or *Juvavum*), capital of the duchy, on the Salzach, 156 m. W. by S. of Vienna; pop. in 1870, 20,336. The situation is one of the finest in Europe. On the left bank of the Salzach is the Mönchsberg, and on the right bank the Kapuzinerberg, and the

town stands within the narrow defile formed by these hills, the outlying houses in the suburbs being built around rocks. The Salzach is spanned by three bridges. The streets are generally crooked, but there are several large squares and many handsome edifices. The principal churches are the fine cathedral, St. Peter's with Haydn's monument, St. Sebastian's with that of Paracelsus, St. Margaret's, restored in 1864, and the university church; and there are 15 other places of worship, including one for Protestants, opened in 1865. The monument of Mozart, who was born here, adjoins a high fountain on a principal square; and that of the archbishop Sigismund stands near the new gate (*Neuthor*). The university, founded in 1620, was suppressed early in the present century. An archbishop resides here, and there is a theological faculty and seminary for priests. In 1818 Salzburg was partly destroyed by fire, but was soon rebuilt. The emperor of Austria and the king of Prussia met here, Aug. 19, 1865, to ratify the convention of Gastein with regard to Schleswig-Holstein and Lauenburg. In 1874 Roman golden ear rings and other relics, including a marble coffin and a milestone of the time of Septimius Severus, were dug up in the city.

SAMANA. See **SANTO DOMINGO**.

SAMARA. See **PHILIPPINE ISLANDS**.

SAMARA. **I.** An E. government of European Russia, bordering on Ufa, Orenburg, Astrakhan, Saratov, and Simbirsk; area, 60,197 sq. m.; pop. in 1870, 1,837,081. The river Volga forms its W. frontier, and it is drained by the Samara, the Irgis, and other affluents of the Volga. The government was erected in 1850.

II. A city, capital of the government, at the confluence of the Samara with the Volga, 518 m. E. S. E. of Moscow; pop. in 1867, 34,494. It is the seat of a Greek bishop, is the chief corn market on the Volga, and has a growing trade in cattle, sheep, fish, caviare, skins, leather, and tallow. Along the Volga are many German and Swiss settlements.

SAMARANG. **I.** A province on the N. coast of Java; area, about 1,500 sq. m.; pop. in 1868, 1,001,252, of whom 5,162 were Europeans. It has numerous rivers, navigable for boats within the limits of the tide. The S. W. boundary is formed by a volcanic range of mountains which rises to the height of 9,000 and 10,000 ft. Along the sea there is a low alluvial plain. The country is very fertile, producing coffee, sugar, cotton, indigo, tobacco, pepper, and rice, of which large quantities are exported. **II.** A city, capital of the province, near the mouth of the river Samarang, about 250 m. E. by S. of Batavia; pop. about 30,000. It is an important commercial centre; there are cotton and leather manufactories; and a railway built in 1868 connects it with the rich agricultural region of the interior.

SAMARCAND (anc. *Maracanda*), a walled city of central Asia, belonging to Russia, formerly in the khanate and 135 m. E. of the city of

Bokhara, about lat. 39° 40' N., lon. 67° 18' E.; pop. from 15,000 to 20,000, mostly Uzbeks. It is situated in the fertile valley of the Zerafshan, 4 m. S. of that river, and in site and surroundings is said to be the most beautiful city in Turkistan; but much of its interior aspect is miserable. It contains a citadel and a large public market place, and a considerable trade is carried on at the bazaars, especially in the products of leather manufacture. Samarcand stands on higher ground than Bokhara, and before the Russian conquest was a summer resort of the emir in consequence of its lower temperature. The principal buildings are the summer palace of Tamerlane, his mosque surmounted by a melon-shaped dome, his reception hall containing the celebrated *köktash*, or blue stone, on which his throne was placed, and his sepulchre in a domed chapel without the city. Three sacred colleges (*medreses*) border the market place.—Samarcand was known to the Chinese as Tshin prior to the times of Alexander the Great. In classical geography it appears as Maracanda, the capital of Sogdiana. Alexander, who occupied it in 328 B. C., slew there his friend Clitus. The Nestorian Christians early made their way thither, and according to Col. H. Yule the see of a Christian bishop was established there early in the 6th century. About the time of the Arab invasion of Turkistan, the city and territory appear to have been ruled by a Turkish prince bearing the title of *tarkhan*. About 710 they fell under the dominion of the Arabs, and subsequently became subject to the dynasty of the Samanides, after the fall of which the city was ruled by various contending chieftains until its capture and the destruction of its fortress by Genghis Khan about 1220. A century and a half later it reappears prominently in history as the capital of Tamerlane, who made it the most famous, luxurious, and magnificent city of central Asia, adorned with imperial palaces and surrounded by extensive and splendid gardens. Vámbéry declares that the reputed magnificence of the buildings is fully borne out by the existing ruins. At that time the city contained 150,000 inhabitants, and was not only the centre of important manufactures and a vast emporium of trade, but also a prominent seat of Mohammedan learning. It maintained 40 colleges, one of which accommodated 1,000 students, and is still even in ruins remarkable for the handsome specimens of fine earth mosaic work in its walls. With the fall of the Timour dynasty Samarcand began permanently to decline, and it is now politically and commercially inferior to Bokhara. It was captured by the Russians in May, 1868, in the course of the war against Bokhara, and was ceded to Russia a few months later. A Russian garrison occupies the citadel, and Samarcand is now the capital of the military district of Zerafshan in the Russian province of Turkistan.

SAMARIA (Heb. *Shomeron*), an ancient city in middle Palestine, in the tribe of Ephraim, so

called after the hill of Shomeron, upon which it was founded about 925 B. C. by Omri, the sixth king of Israel. Omri made Samaria the royal residence, and it remained so until the captivity of the ten tribes. In 721 it was conquered by the Assyrian king Shalmaneser, and peopled with colonists from the Assyrian provinces. In 109 it was besieged, conquered, and razed to the ground by the Asmonean John Hyrcanus; but it must have been soon rebuilt, for in 104 it is mentioned as a town belonging to the Jewish territory. Augustus gave it to Herod the Great, who embellished it with a temple of Augustus and other buildings, strongly fortified it, and called it, in honor of the emperor, Sebaste (the Greek word corresponding to Augusta). The ancient name of the city was also retained, and is mentioned in the New Testament. The later history of the town is unknown, but a little village, Sebus-tieh, with some ruins, still exists on its site, and contains about 60 houses, substantially built of old materials, which exhibit here and there traces of the splendor of ancient Sebaste. Under the Romans a whole division of Palestine was also called Samaria, forming a separate province between Judea and Galilee.

SAMARITANS (Heb. *Shomeronim*, later *Kuthim*, Cuthæans), a people commonly supposed to have sprung, after the conquest of Samaria by Shalmaneser, from the mixture of the natives with foreign colonists from Babylon, Cuthah, Ava, Hamath, and Sepharvaim. As they were a mixed race, their religion was also mixed. More strictly following the Biblical narrative (2 Kings xvii.), Hengstenberg (who has been followed by Hävernick, Robinson, and others) argues that the entire Hebrew population of Samaria had been carried away, that the Samaritan people were wholly of heathen origin, and that the Israelitish worship was established when the colonists obtained from the Assyrian king an Israelite priest, in order to appease the supposed wrath of the national deity by restoring his worship. After the return of the Jews from the Babylonish captivity the Samaritans asked permission to participate in the restoration of the temple, but it was refused; and from this event (535 B. C.) dates the hostility between Jews and Samaritans. It increased in the latter part of the 5th century B. C., when the Persian governor Sanballat erected for the Samaritans on Mt. Gerizim, near Shechem, a temple of Jehovah, and gave them an independent high priesthood, which was bestowed by him upon his son-in-law Manasses, son of the Jewish high priest. Alexander the Great took a Samaritan army with him to Egypt, and many settled in the Thebaid. The colony received reinforcements from Samaria under Ptolemy Soter, and again at the time of John Hyrcanus, who destroyed that city, crushing the power of the Samaritans in Palestine. Remnants of the Egyptian colony are extant, and form a congregation at Cairo. In Palestine a few families are found

at Nablus, the ancient Shechem. Attempts have been made by Europeans to maintain a correspondence with the remnants of the Samaritans; as by Joseph Scaliger in the latter part of the 16th century, by several learned men in England in 1675, by the Ethiopic scholar Ludolf in 1684, and by Sylvestre de Sacy and others. All the letters of the Samaritans written on these occasions, with an essay on their history by De Sacy, may be found in *Notices et extraits des manuscrits de la bibliothèque du roi* (vol. xii., Paris, 1831). The best modern accounts of them are by the Americans Fisk ("Missionary Herald," 1824) and Robinson ("Biblical Researches," vol. iii.), and Guérin, *Description géographique, historique et archéologique de la Palestine, deuxième part, Samarie* (Paris, 1875).—The Samaritans recognize, of the books of the Old Testament, only the Pentateuch, rejecting all the rest of the Hebrew canon, together with the traditions of the Pharisees. Of the Pentateuch they have a translation in the Samaritan language, an Aramaean dialect, mixed with many Hebrew forms and words. In the same language are written their rituals and liturgies, and a number of psalms. (See Gesenius, *Carmina Samaritana*, in his *Anecdota Orientalia*, Leipsic, 1824.) They have also preserved an ancient Hebrew text of the Pentateuch, first described in Europe by Morinus in 1628 (after a copy bought by Pietro della Valle from the Samaritans in Damascus), and shortly after published in the Paris polyglot. It is of considerable importance, agreeing with the Septuagint in a vast number of places where that differs from the ordinary Hebrew text, though Gesenius has proved the studied design of the Samaritan revisers to conform their text to their peculiar anti-Jewish tenets, and the blundering way in which they executed their emendations. It is written in the old Hebrew characters, closely resembling the Phœnician. When the Arabic became the conversational language of the Samaritans, all their works were translated into it; and they have also in Arabic a so-called book of Joshua. (See JOSHUA.) We know from the New Testament that the Samaritans, like the Jews, were waiting for a Messiah, who in their later writings is called Hashshahab or Hattahab, *i. e.*, the Restorer. Their later writings also prove their belief in spirits and angels, in the immortality of the soul, and in the resurrection. They observe the Mosaic ordinances concerning the sabbath, and many other prescriptions of the Mosaic law.—See Juynboll, *Commentarii Historiæ Gentis Samaritanæ* (Leyden, 1846), and John W. Nutt, "Fragments of a Samaritan Targum," edited from a Bodleian manuscript, and containing a sketch of Samaritan history (London, 1874).

SAME, or **SAMOS**. See CEPHALONIA.

SAMNIUM, a division of ancient Italy, bounded N. W. by the territories of the Marsi, Peligni, and Marrucini, N. E. by that of the Frentani, E. by Apulia, S. by Lucania, and S.

W. and W. by Campania and Latium, and comprising most of the present provinces of Campobasso and Benevento, with some surrounding districts. The country is occupied by some of the highest mountain groups of the central Apennines. It was watered by the upper courses of the Sagrus (now Sangro), Tifernus (Biferno), Frento (Fortore), Aufidus (Ofanto), and Volturnus (Volturno), all of which, except the last, flow into the Adriatic. The principal places were Beneventum (Benevento), Caudium (Airola)—near which were the narrow passes called Caudine Forks, where a defeated Roman army passed under the yoke in 321 B. C.—Aufidena (Alfidenza), Bovianum (Bojano), and Æsernia (Isernia). The Samnites were a warlike people of the Sabine race, who conquered the country from the Opicans before the foundation of Rome. With this republic they waged a series of wars, in which Valerius Corvus, Curius Dentatus, Papirius Cursor, Fabius Maximus Rullianus, and other Romans shine as heroes amid frequent calamities and humiliating defeats of their countrymen (343–290 B. C.). They were finally subdued, joined Pyrrhus in 280, but succumbed again, and in 216 took sides with Hannibal, but without any permanent result. They rose again together with other Italians in the social war (90), and were the last of the allies to yield. During the war of Sulla and Marius they tried to recover their independence; but their army was annihilated by Sulla in a battle at the Colline gate of Rome, and their country laid waste and distributed to Roman settlers, the inhabitants being sold into slavery (82).

SAMOAN ISLANDS, or **NAVIGATORS' ISLANDS**, a group in the S. Pacific, about 400 m. N. E. of the Feejee islands, between lat. 13° 27' and 14° 18' S., and lon. 169° 28' and 172° 48' W. They include nine inhabited islands, viz.: Manua, Olosinga, Ofu, Anuu, Tutuila, Upolu, Manono, Apolima, and Savaii; area, according to recent authorities, which reduce the figures of Com. Wilkes's survey of 1839, about 1,125 sq. m.; pop. in 1869, 35,107. Besides these, there are at the E. end of Upolu four islets, Nuulua, Nutali, Taputapu, and Namoa, and between Manono and Apolima an isolated islet called Niulapo. All the islands and islets are of volcanic formation, though the latter are separated from the former by coral reefs. There are extinct volcanoes on most of the islands, and the natives have no traditions of eruptions from any of them; but in 1867 a submarine volcano burst out of the ocean between Manua and Olosinga, and for two weeks shot up jets of mud and dense columns of sand and stones to a height of 2,000 ft. It left no permanent protrusion above the bed of the sea, and it is said to be difficult now to obtain soundings on its site. Manua, the most easterly island of the group, which has an area of about 20 sq. m., rises like a dome to the height of 2,500 ft. Olosinga is a narrow ledge of rocks with a double coral reef around it, the outer shelf

50 to 60 ft. wide, and the inner in some places 140 ft. It contains but 6 sq. m.; Ofu, next to it, is somewhat larger. Tutuila is high and mountainous, with precipices rising from the ocean to a height of from 1,200 to upward of 2,300 ft. Its W. end, which is lower, is covered with luxuriant vegetation and is thickly settled. On its N. coast are many good ports, but the best is Pango-Pango or Pago-Pago on the S. side. It is completely landlocked, has an entrance clear of rocks, and water enough for the largest vessels. It is one of the safest and best harbors in the Pacific, and, being on the direct steamship route between America and Australia, must become in time an important port. The area of the island is about 50 sq. m., and it contains, together with Anuu, an islet off its E. extremity, 3,500 inhabitants. Upolu, the most important island of the group, has an area of about 335 sq. m., and in 1869 had 16,610 inhabitants. A range of broken hills occupies its middle, the sides of which, covered with luxuriant vegetation, slope to the sea. Apia, on the N. side, the chief town, has a population of about 300, of whom 100 are whites. It is the official residence of the various consuls, of the members of the London missionary society, and of the Roman Catholic bishop of Oceania. Almost all the business of the port is in the hands of Hamburg firms. The harbor of Apia is sheltered by a natural breakwater, and is second only to that of Pango-Pango. Manono, which is enclosed within the sea reef of Upolu, has an area of only 3 sq. m. Apolima, about a mile distant, 2 sq. m. in area, is a natural fortress. It is the crater of an extinct volcano, and is a ring of perpendicular cliffs, with a single opening on the N. side, through which only one boat at a time can pass to the basin within. A few miles distant is Savaii, the westernmost and largest island of the group, containing about 700 sq. m. and a population in 1869 of 12,670. Its interior, which has not been explored, is occupied by a mountain chain, in parts nearly 5,000 ft. high, sloping gradually to the sea, and leaving but a strip of alluvial land a few miles wide along the shores. It has little timber and no running streams, and its shores are rocky and precipitous, with few harbors. On the N. side the bay of Mataatu affords good anchorage. A series of wonderful caves in the island have been explored for $2\frac{1}{2}$ m., but not to their full extent.—The climate is very equable, the mercury seldom rising higher than 88° or falling lower than 70° . From observations made in 1872 at Malua in Upolu, the mean temperature for the year was $78^{\circ}33'$. The difference of temperature between sun and shade is seldom more than 7° . Rains are distributed evenly throughout the year, excepting in January, February, and March, when heavy rain storms with northern winds prevail; but destructive storms are rare. The soil is a rich vegetable mould, with a slight proportion of decomposed lava impregnated with iron. Excepting the

shore line, the mountains, and a lava field on the E. end of Savaii, there is little naked land on any of the group. The interior is covered with dense forests of tropical luxuriance, containing many varieties of valuable timber trees. Among the trees and fruits are the banian, two varieties of pandanus, several species of palms, the anauli, bamboo, rattan, breadfruit, cocoanut, wild orange, lemon, lime, banana, plantain, yam, taro, paper mulberry, tacca (from which arrowroot is made), pineapple, vi apple, guava, mango, and citron. Wild sugar cane grows abundantly, and there are two varieties of sea-island cotton, one of longer staple than the other. Tobacco is grown in small quantities, and some coffee is raised. The *ava* (*macropiper methysticum*), which grows in clusters from 6 to 10 ft. in height, is a species of pepper. From its dried root is made an intoxicating beverage, which when taken in small doses is a delightful soporific. There are no traces of native mammalia except a species of bat (*pteropus ruficollis*), which often measures 4 ft. from tip to tip of wings. Horses, cattle, and swine have been introduced. Poultry is plentiful, and pigeons abound. A bird called the tooth-billed pigeon (*didunculus strigerostris*), allied to the dodo, is found in the lonely parts of the mountains.—Among the Polynesian islands the inhabitants of the Samoan group rank in personal appearance second only to the Tongese. The men average about 5 ft. 10 in. in height, are erect and proud in bearing, and have straight and well rounded limbs; the women are generally slight in figure, symmetrical, and easy and graceful in their movements. The skin of both sexes is dark olive, but the chiefs and better families are much lighter. The nose is usually straight and not flattened like that of the Malay, and the mouth is large, with thick lips. In some the eyes are oblique. The hair is black and straight. Beards are not so common as among Europeans, yet many have heavy beards. Polygamy is customary, but two wives seldom live in the same house. They are generally cleanly in their habits and social in disposition. Women are considered the equals of men, and both sexes join in the family labors. Great ingenuity is displayed in the construction of their houses, which are built of the wood of the breadfruit tree, thatched with wild sugar cane or pandanus leaves. The ancient religion of the islanders acknowledged one great God, but they paid less worship to him than to some of their war gods. They had a god of earthquakes, a god who supported the earth, and gods of lightning, rain, and hurricanes, and also many inferior gods who watched over certain districts; and they had carved blocks of wood and stone, erected in memory of certain chiefs, whom they worshipped. All are now nominally Christians; there are schools and a church in every village, and the missionaries have unbounded influence. Nearly all the children seven years of age can read their own

language, and most of the adult population can read and write. The Bible has been translated and printed, and hymn books and other works are published at the missionary printing office. According to a census taken in 1869 by the representatives of the London missionary society, the population was divided denominationally as follows: Independents and Presbyterians, 27,021; Wesleyans, 5,082; Roman Catholics, 3,004.—The commerce of the islands is small. The exports are *coppa*, or the dried meat of the cocoanut, from which oil is made, and a small quantity of cotton. Of the former about 10,000 tons are shipped annually, mainly to Hamburg. The imports are general merchandise and provisions, and some lumber from California and Oregon. Nearly all the trade is controlled by the Hamburg house of Godeffroy and co., who have buildings at Apia and several cotton plantations in the vicinity. In 1873 105 vessels, of 25,198 tons, entered the port of Apia, of which 47 were German, 47 English, and 4 from the United States.—The Samoan islands were named by Bougainville, who visited them in 1768, the *archipel des navigateurs*, from the skill of the natives in using their canoes. In 1787 La Pérouse touched at these islands, and De Langle, the commander of one of his vessels, and 11 men were killed by the natives. The first missionaries landed in Savaii in 1830, from the Society islands, and in 1836 they were joined by others from England. The first Roman Catholic missionaries arrived in 1846. The islands were surveyed by Com. Wilkes in 1839. In 1872 Com. Meade visited the group, and, by arrangement with the native chiefs, took the harbor of Pango-Pango under the protection of the United States. In 1873 a special agent, Mr. A. B. Steinberger, was sent by President Grant to the islands, who reported that the chiefs were desirous that the whole group should be protected by the United States; but in 1875 a native king was elected, and Steinberger became his prime minister.

SAMOS (called by the Turks *Susam-Adassi*), an island of the Grecian archipelago, belonging to Turkey, separated from the coast of Asia Minor by the strait of Little Bosphorus, and from the island of Nicaria (anc. *Icaria*) by the Great Bosphorus; length, from E. to W., 27 m., greatest breadth 12 m.; area, 213 sq. m.; pop. about 15,000, nearly all Greeks. The chief town is Chora. There are several good harbors on the coast. The interior is traversed by two mountain ranges, one of which attains the height of 4,725 ft. in Mt. Kerkis (anc. *Cercetius*). Samos was anciently celebrated for its fertility. The olive and vine are cultivated, and grain, silk, cotton, wine, figs, and oil are exported. The minerals include marble, iron, lead, silver, and emery, but are not worked.—The original inhabitants are supposed to have been Carians and Leleges. The Samians planted several colonies on the shores of the Propontis and Ægean, and early in the

6th century B. C. their navy was the most powerful in the Grecian waters. The capital, Samos, near the site of the present town of Chora, was one of the finest cities in the Hellenic world. Polycrates, who usurped the government about 535 B. C., enriched it with a temple of Juno, artificial moles enclosing the harbor, an aqueduct hewn in solid rock to convey water to the town, and a fortified palace. After his death in 522 the island was subject to Persia for 43 years, when it was liberated by the victory over the fleet of Xerxes at Mycale, and became a member of the Athenian league. It revolted, but was conquered by the Athenians in 439. The Romans made the capital a free city. In the middle ages the island was taken by the Saracens, who were expelled in the 13th century. During the Greek revolution the Samians expelled the Turks, but by the treaty which secured the independence of other parts of Greece Samos remained subject to Turkey, though enjoying special privileges. Since 1835 it has been governed by the Greek family Vogorides. The governor, styled "prince of Samos," pays an annual tribute of about \$18,000 to the sultan. The production and population of Samos have been much reduced within a few years. In February, 1873, an earthquake continuing four days destroyed many lives and much property.

SAMOTHRACE (modern Gr. *Samathraki*; Turk. *Semendrek*), an island of the Grecian archipelago, belonging to Turkey, between Lemnos and the coast of Thrace; area, about 32 sq. m.; pop. about 1,800. It is the highest land in the north of the archipelago. It is sterile and destitute of ports. In antiquity it was called Dardania, Electris, Melite, and Leucosia, and was renowned as a chief seat of the worship of the Cabiri. It was in early times independent, with possessions on the mainland, aided Xerxes in the battle of Salamis, and was afterward subject to Athens, Macedon, and Rome.

SAMOYEDS, a nomadic people in the northern parts of European and Asiatic Russia, forming a branch of the Uralo-Altaic division of mankind. The name, which signifies in Russian "persons who devour themselves," and occurs in early Russian chronicles, would seem to imply that the people had once been cannibals, if it were not more likely that in this instance it is a corruption of some word connected with the Finnic *Suomi* or Lapp *Sam* and *Sabme*. The Samoyeds were originally spread from the Altai mountains to the Arctic ocean, and from the White sea nearly to the river Lena. They are still met with in groups from the White sea to the river Khatanga, but the space between the Obi and the Yenisei is now their principal seat. Their whole number is estimated at less than 20,000, divided into three principal and several smaller tribes speaking different dialects. They are mostly idolaters, of small stature and repulsive features, but peaceably disposed. They dwell in tents of reindeer skin.—See "The Land of the

North Wind: Travels among the Laplanders and the Samoyedes," by Edward Rae (London, 1875).

SAMPHIRE (formerly written *sampire* and *sampetra*, from the old Fr. name *l'herbe de Saint Pierre*, Ital. *San Pietro*, from its grow-



Samphire (*Crithmum maritimum*).

ing on rocks), a very succulent plant of the parsley family or umbellifers, *crithmum maritimum*, with fleshy, dissected leaves, and compound umbels of small white flowers destitute of calyx teeth; the fruit oblong, dark green or purplish. It is a smooth perennial, about a foot high. Samphire is found on rocky cliffs by the seashores of Britain and southward to northern Africa, the roots penetrating deep into crevices by means of their numerous strong fibres. The leaves and young shoots have a pleasant aromatic taste, and the plant was held



Marsh Samphire (*Salicornia herbacea*).

in great esteem by the old herbalists as a stomachic, and used in salads and pickled. It is still used in England as a pickle, and on the

continent is sometimes cooked as a pot herb.

—The plant sometimes called samphire in this country, and marsh samphire in England, is *salicornia herbacea* (Lat. *sal*, salt, and *cornu*, horn, a saline plant with horn-like branches), more generally known as glasswort; it is one of the goosefoot family, or chenopods. Its annual stems are 6 to 12 in. high, leafless and long, succulent, jointed, and much branching; the minute flowers each in a hollow in the stems at the joints. It is very abundant along the coast and in saline marshes in the interior; it is much relished by cattle, and in Europe was formerly burned in large quantities for the soda contained in its ashes. It is said that much of the pickled samphire sold in England is really this plant, which is very abundant and more accessible than the true samphire, from which it differs not only in appearance but in the absence of aromatic flavor.

SAMPSON, a S. E. county of North Carolina, bordered W. by South river and drained by Black river and several tributaries of that stream; area, 940 sq. m.; pop. in 1870, 16,486, of whom 6,483 were colored. The surface is undulating and the soil sandy but fertile. There are extensive forests of pitch pine. The chief productions in 1870 were 281,381 bushels of wheat, 21,950 of peas and beans, 141,373 of sweet potatoes, 1,231 bales of cotton, 19,837 lbs. of rice, 7,523 of tobacco, 11,437 of wool, 35,554 of butter, and 22,664 of honey. There were 1,441 horses, 605 mules and asses, 3,378 milch cows, 1,149 working oxen, 5,267 other cattle, 6,732 sheep, and 22,524 swine. Capital, Clinton.

SAMSON (Heb. *Shimshon*), a judge of Israel, celebrated for his bodily strength. He was the son of Manoah, of the tribe of Dan, and was born about the middle of the 12th century B. C. He was devoted to the life of a Nazarite from his birth, and early began to exhibit superhuman strength. The great achievements recorded of him are connected with his love for his Philistine wife and for two women of loose character, one of whom, Delilah of Sorek, ascertained that the secret of his strength lay in his hair, which had never been shorn. Having entered into a plot against him with the Philistines, she called in a man to cut off his hair while he lay sleeping in her lap; he was then seized by his enemies, deprived of his sight, and made to grind in the prison. But when his hair grew long his strength came back. An immense multitude of Philistines having assembled in a temple to rejoice in his captivity, he was brought in to make them sport, and was placed, where all might see him, between the two central supports of the building. Persuading the lad who held him by the hand to let him feel the pillars and lean upon them, he grasped them both, and exerting all his strength overthrew them, and the building fell, burying the whole assembly, himself included, beneath the ruins. He was a judge of Israel for 20 years.

SAMSON, George Whitfield, an American clergyman, born at Harvard, Worcester co., Mass., Sept. 29, 1819. He graduated at Brown university in 1839, and at Newton theological institution in 1843, and was pastor of the 4½ street Baptist church, Washington, D. C., till October, 1849. He was president of Columbian college from 1859 to 1871, and of Rutgers female college in New York in 1872-'3. He has published a series of letters from Egypt, Palestine, and Italy (1848); *To Daimonion* (1852; enlarged under the title of "Spiritualism Tested," 1860); "Outlines of the History of Ethics" (1860); "Elements of Art Criticism" (1867); and "Physical Media in Spiritual Manifestations" (1869).

SAMSON, Joseph Isidore, a French actor, born in St. Denis, July 2, 1793, died in March, 1871. He was of humble origin, and was at first a lawyer's clerk and a copyist in a lottery bureau. In 1812 he began to study at the conservatory after performing at a minor theatre. From 1832 to 1863, when he retired, he was connected with the Théâtre Français, being especially distinguished in the comedies of Molière and Beaumarchais. He also wrote vaudevilles and dramas, and *L'Art théâtral*, a didactic poem, and lectured on dramatic art. He was professor of elocution at the conservatory for upward of 30 years.—See *Samson et ses élèves*, by Legouvé (Paris, 1875).

SAMUEL (Heb. *Shemuel*, "heard of God"), a Hebrew seer or prophet, the last judge of Israel. He was the son of Elkanah and Hannah, of the tribe of Levi, and was born in the latter part of the 12th century B. C., probably at Ramathaim Zophim in Mt. Ephraim. Even before his birth his mother had bound him to the obligations of a Nazarite, and he was set apart from his early youth to the service of the tabernacle at Shiloh, under the immediate tutelage of Eli. His first prophecy concerned the doom of Eli's house. Twenty years after the death of Eli Samuel assembled the people at Mizpah, urging them to remain faithful to the Lord, and promising them speedy deliverance from the Philistines. At this time he seems to have been acknowledged as judge, an office which he held for about 20 years, restoring everywhere the neglected national worship. The Philistines, the most dangerous foes of Israel, were routed, and did not recruit their strength during the remainder of his leadership. The Amorites, the eastern foes of Israel, remained in peace with him. His dwelling was at Ramah, and in his old age he appointed two of his sons deputy judges at Beersheba. The people became dissatisfied, and demanded a king. Samuel, with great reluctance, at length yielded by divine direction to this demand, and anointed Saul the first king of Israel. He rebuked Saul on several occasions, and at length, in the name of the Lord, anointed David as second king before the demise of Saul. He died before 1060 B. C. According to Jewish tradition, he was the au-

thor of the book of Judges and of a part of the books of Samuel.

SAMUEL, Books of, two canonical books of the Old Testament, reckoned by the Jews as one book. The present division into two books dates from the edition of the Hebrew Bible by Bomberg (1517-'18), and is derived from the Septuagint and Vulgate, in both which versions they are termed the 1st and 2d books of Kings. They consist of the connected biographies of Samuel, Saul, and David. The author of the books of Samuel is unknown. Grotius, Eichhorn, Jahn, Herbst, and Hävernick regard the prophet Jeremiah as the author. Most commentators agree that they were the work of one compiler, who used several older books; but as to the number and character of these they do not agree. The date of the work seems from internal evidences to have been between 975 and 622 B. C. Some writers, as Hobbes, Spinoza, Simon, Le Clerc, Eichhorn, Thenius, and De Wette, have maintained that the book contains contradictory statements; but their arguments have been disputed by Carpzovius, Davidson ("Biblical Hermeneutics"), Hengstenberg, Hävernick, Welte, Keil, and others. Among the most recent commentators are Thenius, *Die Bücher Samuels* (2d ed., Leipsic, 1864); Keil, *Die Bücher Samuels* (1864; English translation, 1866); Wordsworth, in his "Holy Bible, with Notes and Introductions" (1866); and Erdmann, in Lange's *Bibelwerk* (1873). For the latest critical view of the state of the text, see Wellhausen, *Der Text der Bücher Samuels* (Göttingen, 1871).

SANA, or **Sanaa**, a city of Yemen, Arabia, formerly capital of the imamate of Sana, 110 m. E. N. E. of Hodeida; pop. about 20,000. It lies in a fertile valley, about 4,000 ft. above the sea, and is surrounded by a ruinous wall of sun-baked brick, 5½ m. in circumference. It is divided into a Jewish quarter, on the W. side, and the city proper, with the citadel, at the E. end. The imam's palaces are built of cut stone, with extensive gardens, surrounded by separate walls and fortifications. The streets are wide and comparatively well kept, but a large part of the town is in ruins. The climate is subject to great variations; sometimes no rain falls for several years, and the drought produces famine and pestilence; but generally there are rains in January, June, and July. Sana is the centre of the coffee trade of Yemen, and is famous for its fruits, especially grapes. The rich merchants have summer houses at Raudhah, 5 m. N. of the city.—Sana was a city of the Sabæan kingdom, and is of great antiquity. It is probably the Tamna or Thomna of the ancient geographers. It is described by Pliny as a large commercial town, with 65 temples, to which caravans from Gaza resorted. About 930 it became the seat of the imams of Yemen, who ruled all S. W. Arabia. (See **YEMEN**.) In July, 1872, it was taken by the Turks, who have since held it with a garrison of 1,000 men.

SAN ANTONIO, a city and the county seat of Bexar co., Texas, on the San Antonio and San Pedro rivers, 75 m. S. W. of Austin and 250 m. N. by W. of Brownsville; pop. in 1850, 3,488; in 1860, 8,235; in 1870, 12,256, of whom 4,120 were foreigners and 1,957 colored; in 1875, about 16,000, of whom about a third are of German and a third of Mexican origin. It consists of three parts: the old town, or San Antonio proper, between the two streams; Alamo, E. of the San Antonio; and Chihuahua, W. of the San Pedro. The old town is the business quarter, and has in great part lost its Mexican character, having been almost entirely rebuilt since 1860. The two principal streets are Commerce and Market, running parallel to each other from the main plaza. The former is built up with handsome business structures, two and three stories high. Separated from the main plaza by a fine Catholic church is the *plaza de las armas*. From the two plazas run to the right and left a number of other streets, mostly with Spanish names, and still in part occupied by low, castellated Mexican houses, built of limestone, without windows. Chihuahua is almost exclusively Mexican in character and population. The houses are one story high, partly built of stone and partly of upright logs with cane roofs. Alamo is the largest quarter of the city, is considerably higher than the other two, and is mostly inhabited by Germans. It is divided into two parts by the Alameda, an extension of Commerce street. In the N. part is the Alamo plaza, with the fort of that name celebrated in Texan history. (See ALAMO.) The land immediately around the city is level. A mile distant rises a chain of limestone hills, which furnish an excellent building material. The sources of the San Pedro and the adjacent land belong to the city, and are set apart as a public park, which has long been the principal pleasure resort of the citizens.—San Antonio is the chief city of W. Texas, and has an extensive trade. Its most important manufactories are three large flouring mills, a soap and candle factory, a wood and stone cutting establishment, two ice factories, a meat extract factory, and three breweries. It has a national bank, with \$125,000 capital, and four private banks. The city is not yet reached by any railroad, but the Gulf, Western Texas, and Pacific, and the Galveston, Harrisburg, and San Antonio lines, in progress (1875), will connect it with Indianola and with Houston and Galveston respectively. The former is completed to Cuero, 75 m. S. E., and the latter to Kingsbury, 42 m. E. N. E. Regular lines of stage coaches run to these points and to Austin. San Antonio is divided into four wards, and is governed by a mayor, recorder, and a board of twelve aldermen. It has a good fire department. There are a hospital and a female orphan asylum, under the control of the Roman Catholics; a Roman Catholic college and convent; two German-American schools; five free public schools with about

1,000 pupils; two daily, a tri-weekly (German), and three weekly (one German) newspapers; and ten churches, viz.: 1 Episcopal, 1 Lutheran, 3 Methodist (2 colored), 1 Presbyterian, and 4 Roman Catholic.—San Antonio was founded in 1714 by the Spaniards, who established a fort on the right bank of the San Pedro, and called it San Fernando. Near this some monks in 1718 established the mission of the Alamo. On account of the Indians, both the fort and mission were removed to the left bank, where the *plaza de las armas* now is. The settlers established themselves around this, and called it San Antonio de Bexar, while a portion of the town E. of this was called San Antonio de Valero. The mission continued to be called San Antonio de Valero till 1783. San Antonio was the centre of important operations in the wars for Mexican and Texan independence. It was incorporated as a city in 1733. The German immigration commenced in 1845.

SAN ANTONIO RIVER, a river of Texas, rising in Bexar co., and following a general S. E. course of nearly 200 m. to Espiritu Santo bay. It unites with the Guadalupe about 12 m. from its mouth. Its largest tributaries are the Medina and Salado in Bexar co., and the Cibolo in Karnes co. The chief towns on its banks are San Antonio and Goliad.

SAN AUGUSTINE, an E. county of Texas, bordered W. by Angelina river and Attoyac bay, and drained by their branches; area, 680 sq. m.; pop. in 1870, 4,196, of whom 1,964 were colored. The soil is very rich and produces excellent cotton. The chief productions in 1870 were 110,007 bushels of Indian corn, 10,082 of sweet potatoes, 2,598 bales of cotton, and 1,135 lbs. of wool. There were 913 horses, 2,576 milch cows, 791 working oxen, 5,368 other cattle, 1,221 sheep, and 8,713 swine. Capital, San Augustine.

SAN BENITO, a W. county of California, bounded E. by the main range of the Coast mountains, and embracing the valley of the San Benito river. It was formed in 1874 from the E. portion of Monterey co. The raising of sheep and cattle is largely pursued, and agriculture is carried on to some extent. It is traversed by the Southern Pacific railroad. Capital, San Benito.

SAN BERNARDINO, a S. E. county of California, bounded N. E. by Nevada, and E. by Arizona, from which it is separated by the Colorado river; area, about 16,000 sq. m.; pop. in 1870, 3,988. About three fourths of the county, comprising the N. and E. portions, consists of dry desert valleys and volcanic mountains. This region has little vegetation, and is interspersed with hot springs and deposits of sulphur and soda. There are some streams that lose themselves in "sinks." Death valley, in which the Amargosa river disappears, is from 100 to 250 ft. below the level of the sea, is destitute of good water, and is extremely hot in summer. Gold and silver are found in the Sierra Nevada mountains in

the north. In the S. W. part of the county, here crossed by the Coast range, are extensive valleys having a delightful climate and a fertile soil. The mountains contain an abundance of pine, cedar, hemlock, maple, &c. In this district are found gold, copper, tin, marble, and alabaster, and silver mines are worked successfully. The largest stream is the Santa Ana, which flows into the Pacific. The chief productions in 1870 were 10,356 bushels of wheat, 12,250 of Indian corn, 51,906 of barley, 48,730 gallons of wine, 71,075 lbs. of wool, 21,780 of butter, 7,000 of cheese, and 1,808 tons of hay. There were 970 horses, 622 milch cows, 2,498 other cattle, 18,121 sheep, and 1,066 swine; 2 manufactories of saddlery and harness, 1 flour mill, and 5 saw mills.—**SAN BERNARDINO**, the capital, is situated in a fine valley, about 60 m. E. of Los Angeles; pop. in 1870, 3,064. The town is supplied with water by artesian wells, and the numerous fruit and ornamental trees give it a very beautiful appearance. The view of Mount San Bernardino, the loftiest peak of the Coast range, is exceedingly grand.

SANCHUNIATHON, or *Sanchoniathon*, the name prefixed, as that of the author, to a history of Phœnicia and Egypt published by Herennius Philo of Byblus as a Greek translation from the Phœnician. Philo, a grammarian who flourished early in the 2d century A. D., represents Sanchuniathon as a native of Berytus, and as having written in the time of Semiramis, dedicating his work to Abibalus, a national king of Berytus. Of this work a considerable fragment is preserved in Eusebius, who quoted Sanchuniathon in corroboration of certain Biblical statements which Porphyry had assailed. It is now, after much learned controversy, the belief of most critics that the so-called history of Sanchuniathon was originally written by Philo. Richard Cumberland, bishop of Peterborough, translated the fragment from Eusebius, with copious chronological and historical notes (8vo, London, 1720). The Greek fragments still extant have been published by Orelli (Leipsic, 1826), and in Cary's "Ancient Fragments" (London, 1832). In 1837 Friedrich Wagenfeld published at Bremen what purported to be the entire Greek text of Philo's Sanchuniathon, but it proved to be a fabrication of the editor.

SAN CRISTÓBAL, a city of Mexico, capital of the state of Chiapas, 450 m. S. E. of the city of Mexico; pop. in 1869, 7,649. It is situated in a fertile and well cultivated valley, on the E. slope of the central mountain range, and has good streets and houses, the latter mostly of one story. Lead and iron abound in the surrounding country. The chief industries are cattle rearing, and the manufacture of coarse woollen and cotton stuffs and common earthenware.—The town was founded in 1528 under the name of Villa Real, and was successively called San Cristóbal de los Llanos and Ciudad Real; it received its present name in 1829.

SANCROFT, William, an English prelate, born at Fresingfield, Suffolk, Jan. 13, 1616, died there, Nov. 24, 1693. He was educated at Emmanuel college, Cambridge, and became a fellow in 1642, but subsequently lost his fellowship by refusing to subscribe to the "Solemn League and Covenant." He was chosen one of the university preachers in 1660, was rector of Houghton-le-Spring, a prebendary of the cathedral of Durham, and in 1678 became archbishop of Canterbury. When James II. issued his declaration for liberty of conscience, and required the clergy to publish it, Sancroft refused, and with six other bishops presented a petition to the king against it. The seven prelates were committed to the tower on a charge of libel, but were acquitted. Sancroft refused to take the oath of allegiance to William and Mary, and was deposed. He published some sermons, and "Letters to Mr. North" (afterward Sir Henry). His "Modern Policies and Practices," from Machiavelli and others, was published in 1757.

SANCTUARY. See ASYLUM.

SAND, George. See DUDEVANT.

SAND, Karl, a German political fanatic, born at Wunsiedel, in Franconia, Oct. 5, 1795, executed near Mannheim, May 20, 1820. After studying theology at the universities of Tübingen and Erlangen, he went in 1817 to that of Jena, where he joined the Teutonic society, a precursor of the *Burschenschaften*. He was an enthusiast in the cause of liberty, and conceived it to be his duty to destroy Kotzebue, whose writings and connection with the Russian court had made him especially obnoxious to the German patriots. Having delivered a letter to him at his residence in Mannheim, March 23, 1819, while he was reading it Sand struck him thrice with a dagger, then went into the street, and kneeling down cried, "Long live my German fatherland," and stabbed himself. His wound was not mortal, and on May 5, 1820, he was condemned to death.

SANDAL WOOD (Sansk. *chandana*), the aromatic wood of several species of *santalum* (Pers. *sandul*), especially *S. album*, of the East Indies. The genus gives its name to a small family of apetalous, exogenous plants, comprising herbs, shrubs, and trees, most of which are parasitic by their roots, at least when young. Besides the above named species of *santalum*, others, in the Hawaiian and Feejee islands and Australia, furnish sandal wood, some of which finds its way into commerce. The Indian sandal wood is a tree 20 to 30 ft. high, with a trunk 6 to 12 in. through; it is rather local, being found most abundantly in Mysore, where the trees are a monopoly of the East India company, and can only be felled by the proper officers, and in Madras they are also under government control. Where there is no restriction the trees soon become exterminated, but in the localities referred to the supply is kept up by new plantations. The trees reach their full size in 20 or 30 years; after they are

felled and the branches removed, the trunks are allowed to remain on the ground for several months in order that the white ants may eat away the worthless sap wood; the trunk is cut into pieces 24 and 30 in. long, carefully trimmed, weighed, and assorted for shipment.



Sandal Wood (*Santalum album*).

The wood is very heavy, its density and aroma being greatest when it grows on dry and poor soil; the color is a pale brown, varying in different samples; it splits easily; has a persistent odor which is agreeable to most persons; its taste is strongly aromatic. The aroma of the wood depends upon a volatile oil, which is light yellow and thick, and begins to boil at 385° F.; a resin is also found in the wood. Sandal wood is mentioned in a Vedic work written as early as the 5th century B. C.; it was used in sacred buildings in India; the gates constructed for the temple of Somnath in Guzerat, and carried off on its destruction about 1025, are of carved sandal wood, and though over 1,000 years old are in good preservation. It was used in embalming princes. The great consumption of the wood is in China; in 1866 there were received at the various ports 5,197 tons. The oil is made at the localities where the trees grow; the roots are dug up for the purpose, and the chips and sawdust are also used; in 1872-'3, 10,348 lbs., valued at £8,374, were imported into Bombay, a large share of which was reexported. In the East the wood is used in religious ceremonies, and the wealthy Hindoos add sticks of it to the funeral pile to show their respect for the departed. In India it is the best substitute for box wood for engravers' use; it is used largely by the Chinese for cabinet work, as its odor repels insects, for small boxes, and the framework of fans; they also burn it as incense in their temples. Within a few years the oil has come into use as a substitute for copaiba in the treatment of gonorrhoea.—**RED SANDAL WOOD**, or **SAUNDERS WOOD**, is fur-

nished by *pterocarpus santalinus*, a tree of the *leguminosæ*, and a native of various localities in southern India. It is 20 to 30 ft. high, and seldom over 4 ft. in girth; like the true sandal wood, it is controlled by government, and is now raised in plantations; it is found in commerce in irregular logs consisting of the heart wood of the lower part of the trunks and the larger roots; it is of a deep red color and takes a fine polish. The natives of India use it in their temples, and for turned work. It was formerly supposed to be medicinal, but is now used only for coloring; the compound spirit of lavender, popularly called red lavender, owes its color to this, as does Stoughton's bitters. The coloring matter is santalic acid, or santaline, a resinoid, soluble in alcohol, ether, and alkaline solutions.

SAND BLAST. A method of engraving figures on glass or metal, or cutting away or boring holes in hard substances, by a rapid stream of sharp sand, invented by Mr. B. C. Tilghman of Philadelphia. The jet of sand may be driven by a blast of steam from a boiler, at high pressure (from 50 to 300 lbs. per square inch), or by an air blast produced by a fan blower revolving with great velocity (a 30-inch fan 1,500 to 2,000 times per minute). The sand is contained in a hopper, and is let down through a tube with a fine orifice, which may be inclined at any desired angle. Surrounding the sand tube is the blast pipe, the effect being to carry the stream of sand with nearly the velocity of the steam or air jet against the object to be operated on, which is placed in a box, and adjusted by means of slides so that it may be moved in front of the jet as the figures are being cut. The box must have openings for the exit of the air. In an experiment with this apparatus a hole an inch and a half in diameter and of the same depth was bored through a piece of corundum in a little less than half an hour, the sand being driven by a steam jet at 300 lbs. pressure per square inch. A diamond was easily reduced in weight and a topaz completely dissipated in one minute. Patterns of objects may be laid upon the glass in the manner of stencil plates, and engraved with great facility. An engraving of a photographed coating of gelatine upon glass may also be taken.

SAND CRAB. See **CRAB**.

SANDEAU, Léonard Sylvain Jules, a French author, born at Aubusson, department of Creuse, Feb. 19, 1811. He was a lover of George Sand, and published with her the celebrated novel *Rose et Blanche*. A complete collection of his novels appeared in 2 vols. in 1859. One of his most successful plays is *Mlle. de la Seiglière*, adapted from his novel of the same title. He is a member of the academy and a director of the Mazarin library.

SAND EEL. See **EEL**.

SANDEMANIANS, a sect of Christians who originally separated from the Presbyterian church of Scotland. Their actual founder was the

Rev. John Glass, a native of Dundee (1695-1773), and they were at first known as Glassites; but subsequently they were called Sandemanians, from the Rev. Robert Sandeman, the son-in-law of Glass, who reduced his opinions to a system. Sandeman was born in Perth about 1720, and in 1764 settled in Danbury, Conn., where he died in 1771. Under his influence churches were gathered in the principal cities of Scotland, in Newcastle, London, and other English cities, and in several towns of Connecticut and Massachusetts. But few of these remain; the most important are at Dundee, Edinburgh, and Danbury. The number of persons at present belonging to the sect is probably less than 2,000. The peculiarities of the Sandemanians are their construction of the word "faith," which they interpret as simple assent to the teaching and divinity of Christ; rejection of all mystical or double sense from the Scriptures; prohibition of all games of chance; weekly love feasts, being the dinner of all the church together on every Sunday; the kiss of brotherhood, which passes between all the members, male and female, at their solemn meetings; strict abstinence from all blood and "things strangled," according to the Jewish precept; plurality of elders, two at least being required for all acts of discipline and all administration of ritual; prohibition of college training; and the absence of prayer at their funerals. Their religious services are confined mostly to the reading and explanation of Scriptures; and where there is no special church, the meetings are held in the houses of the brethren. The custom of washing feet is now discontinued.—See the writings of John Glass (4 vols. 8vo, Edinburgh, 1762).

SANDERLING, a wading bird of the genus *calidris* (Cuv.), differing from the sandpipers

to 8 in. long, with an alar extent of 12½ in., the bill 1 in. and the tarsus the same, and the weight 1¼ oz. The plumage above is ashy gray with lighter edges, with spots of brownish black on the head and back, and with fine transverse lines on the rump and upper tail coverts; under parts pure white; shoulders brownish black without spots; quills with white shafts; the greater wing coverts widely tipped and the middle tail feathers edged with white; bill and legs greenish black; the bill is straight, a little widened at the end; the tail is doubly emarginated, the middle feathers the longest; both sexes are alike; in the spring the plumage is more or less tinged and edged with yellowish red. It is abundant from the Atlantic to the Pacific, in winter going to the southern states and to South America. The European bird presents no certain distinguishing marks from the American.

SAND GROUSE. See GROUSE.

SANDHURST (formerly BENDIGO), a city of Victoria, Australia, 82 m. N. N. W. of Melbourne; pop. about 25,000. The town is well lighted and supplied with water, and the principal streets are paved. The main street, Pall Mall, has many fine shops, and numerous imposing brick and stone buildings. The banks, the government and municipal offices, the hospital, benevolent asylum, mechanics' institute, and Lyceum theatre are among the principal buildings. Sandhurst is one of the chief railway stations of Victoria, and is the headquarters of a rich gold-mining region.

SAN DIEGO, the S. county of California, bounded E. by Arizona, from which it is separated by the Colorado river, S. by Lower California, and W. by the Pacific ocean; area, about 13,500 sq. m.; pop. in 1870, 4,951. Two branches of the Coast range cross it from N. to S., dividing it into three divisions differing much in climate, soil, and topography. The division along the coast is about 25 m. wide, and consists largely of level plains or gently sloping valleys, watered by the San Bernardo, San Diego, San Luis Rey, Margarita, Sweetwater, and other rivers; the greater portion is suitable for agriculture and grazing. The central or mountain division is very irregular in outline, averaging nearly 40 m. in width. Both ranges are covered with forests of oak, cedar, pine, and fir, and contain gold, silver, copper, and other minerals. Valuable gold mines have been opened within the past four years. Between them are a number of broad valleys or table lands, having a delightful climate and a fertile soil. They produce grapes, oranges, wheat, barley, &c. The E. division is occupied by the Colorado desert, which is for the most part treeless and barren, and part of it is below the level of the sea. It is very dry and hot, and contains many natural curiosities, among which is a lake of boiling mud, about half a mile long by 500 yards wide. The chief productions in 1870 were 32,947 bushels of wheat, 9,330 of Indian corn, 18,745 of bar-



Common Sanderling (*Calidris arenaria*).

(*tringa*, Linn.) chiefly in the absence of the hind toe. The common sanderling is the *C. arenaria* (Ill.), inhabiting the temperate regions of America and Europe; it is from 7¾

ley, 9,250 lbs. of wool, and 1,433 tons of hay. There were 5,687 horses, 1,268 milch cows, 20,347 other cattle, 16,443 sheep, and 1,683 swine. Capital, San Diego.

SAN DIEGO, a city, port of entry, and the capital of San Diego co., California, on the N. E. shore of a bay of the same name, about 460 m. S. E. of San Francisco, and 15 m. N. of the Mexican border; lat. $32^{\circ} 44' 41''$ N., lon. $117^{\circ} 8' W.$; pop. in 1870, 2,300; in 1874, about 4,000. It has one of the three good harbors on the Pacific coast of the United States, and has been fixed by act of congress as the western terminus of the Texas and Pacific railroad. Its climate is remarkably equable and salubrious, the thermometer rarely rising to $80^{\circ} F.$ or sinking to the freezing point. Many visit it as a health resort. The exports in 1874, consisting mainly of gold bullion, wool, wheat, flour, barley, hides, honey, wine, and olive oil, amounted to \$2,000,000. There are four churches, two academies, two daily and two weekly newspapers, two banks, a fine court house, and a steam flouring mill. The city was laid out in 1868.—North San Diego, a small hamlet 4 m. N. of the city proper, was the first place settled by white men in California. Father Junípero, a Jesuit priest, with a number of followers, landed there in May, 1768, and soon afterward founded the mission of San Diego.

SAND LAUNCE. See EEL.

SAND MARTIN. See SWALLOW.

SAN DOMINGO. See SANTO DOMINGO.

SANDOVAL, Prudencio de, a Spanish historian, born about 1560, died in Pamplona, March 17, 1621. He was a Benedictine monk, and was appointed by Philip III. historiographer of Spain, in 1608 bishop of Tuy, and in 1612 bishop of Pamplona. His principal works are: *Historia de la vida y hechos del emperador Carlos V.* (2 vols., 1604-'6), of which there are abridgments in English by James Wadsworth ("The Civil Wars of Spain," fol., London, 1652) and Capt. John Stevens ("History of Charles V.," 1703); *Historia de los reyes de Castilla y de Leon* (1615); and *Las crónicas de los quatro obispos*, an edition of the works of four chroniclers of the 12th century.

SANDPIPER, the common name of the *tringa*, an extensive subfamily of small wading birds of the snipe family. They have the bill as long as or longer than the head, slender, compressed on the sides, with the culmen slightly depressed and enlarged near the tip, and the greater portion covered with a soft, very sensitive skin; the nostrils are basal, in a groove extending for two thirds of the bill; the wings long and pointed, the tail moderate and nearly even, the tarsi usually long and slender, and the toes but slightly united at the base. In the typical genus *tringa* (Linn.) the first primary is longest, the tertiaries long, and the secondaries short; the tarsus is covered in front with transverse scales, the hind toe very small, the anterior toes margined with mem-

brane and free at the base. There are between 20 and 30 species, in all parts of the world, some widely diffused, and a few common to America and Europe; they are usually seen in flocks on the seashore or on the margin of lakes and rivers, and in marshes, probing the sand and mud with the bill in search of worms and minute crustaceans. They are generally migratory. The colors of the spring and autumn plumage are different in most species, which has created some confusion in specific descriptions; both sexes are much alike in color, but the females are frequently the largest.—Among the American species is the purple sandpiper (*T. maritima*, Brunn.; *argutella*, Baird), found on the shores of eastern North America, and in winter in tropical North and South America, and also in the temperate parts of Europe; gunners call it the rock snipe, from its frequenting rocky instead of sandy shores. The red-backed sandpiper



Least Sandpiper, or Peep (*Tringa Wilsonii*).

T. alpina, Linn.; *schœnichus*, Möhr.) is very abundant on the Atlantic shores in sandy and muddy places; it is found also in temperate Europe, where it is called dunlin and purre; Mr. Cassin thinks the American bird a distinct species, and gives it the name of *Americana*. The nest is a slight hollow in a dry place lined with grass; the young leave the nest as soon as hatched, as do all the species. The least sandpiper, or peep (*T. Wilsonii*, Nutt.), is the smallest of the group in this country, being only $5\frac{1}{2}$ to 6 in. long; it is abundant over the entire temperate regions of North America; it breeds in the far north, arriving in Massachusetts early in July. Its congener in Europe is the *T. minuta* (Leisler).—Among the European species of sandpipers, the ruff, the knot, and the sanderling have been noticed under these titles.

SANDRART, Joachim von, a German painter, born in Frankfort, May 12, 1606, died in Nuremberg, Oct. 14, 1688. He was a pupil of

Gerhard Honthorst, and was employed by the emperor Ferdinand III. and Maximilian of Bavaria. He published the *Academia Artis Pictoriae, Romæ Antiquæ et Novæ Theatrum*, and other works, which were translated into German (8 vols. fol., Nuremberg, 1769-'75).

SANDS, Robert Charles, an American author, born in Flatbush, Long Island, May 11, 1799, died in Hoboken, N. J., Dec. 17, 1832. He graduated at Columbia college in 1815, and in 1820 commenced the practice of law. With J. W. Eastburn he wrote the poem "Yamoyden" (New York, 1820), in 1824 edited for a time the "Atlantic Magazine," in 1825-'7, with William Cullen Bryant, the "New York Review," and from 1827 till his death was an editor of the daily "Commercial Advertiser." With Bryant and Verplanck he wrote the "Talisman," an annual (3 vols., 1828-'30, afterward republished as "Miscellanies"), in which appeared the "Dream of the Princess Papantzin," one of his longest poems; and he was associated with Bryant, Paulding, Leggett, and Miss Sedgwick in "Tales of Glauber Spa" (2 vols., 1832). He also published "Life and Correspondence of Paul Jones" (1831). His works were edited with a memoir by Gulian C. Verplanck (2 vols. 8vo, New York, 1834).

SANDSTONE, a rock formed of grains of sand, often intermixed with coarse pebbles, cemented together by the infiltration of calcareous, argillaceous, ferruginous, or silicious substances. This, with long continued pressure, has converted the collections of sand into solid rock. Sandstone strata occur through all the geological formations from the metamorphic group upward, and the hard quartz rocks of this group are now understood to be altered sandstones. Those formations of the stratified rocks in which layers of sandstone prevail are often specially designated by this name. Beds of very coarse pebbles are known as pudding-stones and conglomerates. (See CONGLOMERATE.) The Potsdam sandstone, near the base of the Silurian rocks, is extremely hard, close-grained, and quartzose, often occurring in broad sheets and little intermixed with other strata. Its beds in several places in New England, New York, and E. Pennsylvania attain a thickness of more than 300 ft.; and at Potsdam in St. Lawrence co., N. Y., a thickness of 70 ft. is exposed in the quarries. The rock is remarkable for its uniform thickness in broad sheets; masses are taken out 30 ft. square and 2 ft. or more thick, perfectly solid and smooth. Divisional planes are exposed by the hammer and wedges, and the thickness of the sheets may be reduced to an inch. The general color is yellowish brown, variously shaded in the different layers. (See POTSDAM.) Many other sandstones are extensively employed for building, some of which are easily quarried in sheets, of agreeable color, and well suited by their hardness and sharpness of grit for architectural ornaments. Such especially are the grits or harder sandstones of the coal measures, usually

brownish yellow or whitish. The formations known as the old red and new red sandstones afford quarries of superior building stones; but they also contain many layers of very inferior stone. The old portion of the capitol at Washington is built of an inferior variety of sandstone from the Potomac. In England sandstone is much more used for building than other rocks. Edifices of the 12th century, of the hard grits of the coal measures and underlying formations, as Melrose abbey and the cathedral of Glasgow, are in the finest state of preservation; and in some of those of the next century, as Ecclestone abbey near Barnard castle, the original sharp outlines of the delicate mouldings and other decorations are still finely retained; while other edifices, as Durham castle, and even the Hunterian museum in Glasgow, built in 1804, manifest decided symptoms of decay. The cause of these differences may be the imperfect consolidation of the grains in the poorer kinds, and a texture that admits the absorption of water, which, freezing and thawing within the mass, throws off successive portions from the outside; or it may be the original intermixture of foreign substances that are acted upon by atmospheric influences, as iron pyrites and carbonate of lime. Both of these together are particularly destructive from the sulphuric acid generated in the decomposition of the former attacking the carbonate and removing this from the stone.—The sandstones employed for architectural purposes in the United States are chiefly from quarries of the new red sandstone formation in the Connecticut river valley and in New Jersey; they are also imported from Nova Scotia and New Brunswick, and from Caen in France. The Nova Scotia and New Brunswick sandstones are chiefly from the vicinity of Shepody bay at the head of the bay of Fundy, and are known in the New York market as the Dorchester and Albert stone. The rock is yellowish brown, darker than the Caen stone, of even grain, and much of it very free from foreign substances. The quarries furnish very large blocks, and are directly on the shore of the bay, accessible to large vessels. For flagging stones several varieties of sandstone answer an excellent purpose, as for example the broad slabs of the Potsdam sandstone already referred to. New York city is chiefly supplied with them from Ulster, Greene, and Albany counties, and from the formation known as the Hamilton group. The principal shipping points are Kingston, Saugerties, Malden, New Baltimore, and Coxsackie on the Hudson river, and the quantities sent down annually amount to several million square feet. The stone is obtained in immense sheets of any desired thickness from nearly horizontal strata, and is regularly divided by perpendicular joints, which are as smooth as if cut by a saw.

SANDUSKY, a N. county of Ohio, bordered N. E. by Sandusky bay in Lake Erie, intersected by Sandusky river, and also drained by

Portage river and several smaller streams, and traversed by several railroads; area, about 425 sq. m.; pop. in 1870, 25,503. It has a low and level surface and fertile soil. In the W. part is the Black swamp, covered with forests, which has been reclaimed and is highly productive. The chief productions in 1873 were 405,116 bushels of wheat, 789,793 of Indian corn, 280,013 of oats, 121,575 of potatoes, 474,769 of apples, 21,131 tons of hay, 67,329 lbs. of cheese, and 141,879 of wool. In 1874 there were 8,726 horses, 18,301 cattle, 40,370 sheep, and 20,227 swine; in 1870, 5 manufacturing of brick, 11 of carriages and wagons, 1 of railroad cars, 6 of furniture, 4 of iron castings, 2 of engines and boilers, 7 of cooperage, 1 of woollens, 6 flour mills, 30 saw mills, and 6 tanneries. Capital, Fremont.

SANDUSKY, a city, port of entry, and the capital of Erie co., Ohio, finely situated on the S. shore of Sandusky bay, 3 m. from Lake Erie, and 105 m. N. by E. of Columbus; pop. in 1860, 8,408; in 1870, 13,000; in 1875, about 20,000. It has an excellent harbor, the bay being about 20 m. long by about 5 m. wide, with an average depth of 14 ft., easy of access, and secure in all weather. The city is built on an inexhaustible bed of excellent limestone, extensively employed for building purposes and in the manufacture of lime. The site rises gradually from the shore and commands a beautiful view of the bay. The city and neighboring islands are a favorite summer resort. The Lake Erie division of the Baltimore and Ohio railroad, and the Cincinnati, Sandusky, and Cleveland, and Lake Shore and Michigan Southern railroads, meet here. Sandusky is extensively engaged in exporting fresh and salted fish, ice, pine and hardwood lumber, shingles, and laths, and is the centre of one of the most important vine-growing districts in the United States. The value of imports from Canada for the year ending June 30, 1874, was \$26,240; of exports to Canada, \$264,914. The number of entrances was 136, tonnage 12,089; clearances, 155, tonnage 14,332. The number of entrances in the coastwise trade was 3,140, tonnage 479,897; clearances, 3,124, tonnage 474,602. The city is celebrated for its manufacture of articles in wood, of which handles, spokes and hubs, "bent work" for carriages, and carpenters' tools are the most important. It contains three national banks, several public schools, a daily, a semi-weekly, and three weekly newspapers, and 14 churches.

SAND WASP, the common name of a family of fossorial hymenopterous insects, the *sphégi-dæ* of Latreille. They have a long abdomen attached to the thorax by a long thin pedicel, filiform antennæ, and feet adapted for digging. There are numerous species, generally large, violet blue, sometimes banded with yellow; the females have a sting; there are no neuters, the female making her own nest in the sand. After laying an egg in a cell the mother places in it living insects, stinging them so as to pro-

duce stupefaction, and then closes the cell; the larva feeds upon the imprisoned insects, and grows rapidly; it then spins a silky cocoon in which it undergoes transformation. Some wasps of the family *crabronidæ* also make their nests in sand and earth.

SANDWICH, a town of Barnstable co., Massachusetts, extending across the peninsula of Cape Cod from Cape Cod bay to Buzzard's bay, 50 m. S. S. E. of Boston; pop. in 1870, 3,694; in 1875, 3,416. There are within the town eight stations on the Old Colony railroad and Wood's Hole branch, and nine post offices, viz.: Cohasset Narrows, East Sandwich, Monument, North Sandwich, Pocasset, Sandwich, South Sandwich, Spring Hill, and West Sandwich. The bays afford fine facilities for bathing and fishing. Many summer cottages have been erected in different parts of the town. The principal village is on the N. side, and is nearly surrounded by hills from which extensive views may be obtained. In clear weather Provincetown, 30 m. distant across the bay, is visible. The route of the projected ship canal, to connect the waters of Buzzard's bay with those of Cape Cod bay, lies through this town. The establishment of the Boston and Sandwich glass company is the largest of its kind in New England, and produces articles of superior quality. There are also a tack factory, a car factory, two iron foundries, a savings bank, 21 public schools, a weekly newspaper, a library of 1,100 volumes, and 10 churches.

SANDWICH ISLANDS. See HAWAIIAN ISLANDS.

SANDYS. I. Sir Edwin, an English statesman, born in Worcester in 1561, died at Northborne, Kent, in 1629. He was the son of Dr. Edwin Sandys, then bishop of Worcester, afterward archbishop of York. He studied at Oxford, where he was the pupil of Richard Hooker, and afterward travelled extensively on the continent, and published "Europæ Speculum, or a Survey of the State of Religion in the Western Part of the World" (best ed., 4to, 1637). Having supported the succession of James I., he was knighted by that monarch in 1603. He was an influential member of the second London company for Virginia, in which he took the lead in measures of reform, and introduced the vote by ballot. In 1619, having been elected treasurer of the company, as its chief officer was then called, he established in the colony representative government, and was indefatigable in promoting public security and prosperity. Spanish influence was exerted against him, and in 1620 King James, in violation of the charter, forbade his reelection; but his successor was his friend the earl of Southampton, who continued his policy. II. George, an English poet, brother of the preceding, born at Bishopsthorpe in 1577, died at Boxley abbey, Kent, in March, 1644. He was educated at Oxford, and published "A Relation of a Journey begun A. D. 1610, in Four Books, containing a Description of the Turk-

ish Empire, of Egypt, of the Holy Land, and of the Remote Parts of Italy and Islands adjoining" (fol., 1615; 7th ed., 1673), and a translation of the first five books of Ovid's "Metamorphoses" (2d ed., 1621). In 1621 he became colonial treasurer of Virginia, where he distinguished himself by his public zeal. He executed all orders concerning staple commodities; to him is due the building of the first water mill; he promoted the establishment of iron works in 1621, and in the following year introduced ship building. He translated the last ten books of the "Metamorphoses" while in Virginia. When the king broke up the Virginia company in 1624, he returned to England, where in 1626 he published the translation of the whole. He also wrote poetical versions of the Psalms (1636), of the book of Job, Ecclesiastes, Lamentations, &c. (1639), and of the Song of Solomon (1642). His life, by the Rev. H. J. Todd, is prefixed to "Selections from Sandys's Metrical Paraphrases" (London, 1839). A collective edition of his poetical works, with an introduction and notes, has been published by the Rev. R. Hooper (2 vols., London, 1872).

SANFORD, a N. W. county of Alabama, bordering on Mississippi, and drained by affluents of the Tombigbee river; area, about 600 sq. m.; pop. in 1870, 8,893, of whom 1,563 were colored. The surface is rolling and the soil is fertile. The chief productions in 1870 were 18,672 bushels of wheat, 219,437 of Indian corn, 14,128 of oats, 31,619 of sweet potatoes, 72,157 lbs. of butter, and 1,825 bales of cotton. There were 1,462 horses, 496 mules and asses, 2,518 milch cows, 4,470 other cattle, 6,784 sheep, and 11,463 swine. Capital, Vernon.

SAN FERNANDO, a city of Andalusia, Spain, 7 m. S. by E. of Cadiz, on the Isla de Leon; pop. about 18,000. It is joined to the mainland by an ancient Roman bridge, and between it and Cadiz extend vast salt marshes. Salt, rum, liqueurs, leather, and soap are manufactured. The town was founded about 1750, and in 1808 had 40,000 inhabitants. Two miles distant is the suburb of San Carlos, with the residence of the captain general and several public establishments.

SAN FRANCISCO, the chief city of California (in law, the city and county of San Francisco), the principal commercial emporium on the Pacific coast of America, in lat. 37° 46' N., lon. 122° 24' W. It is situated at the N. end of a peninsula, which is 30 m. long and 6 m. across at the city, and separates San Francisco bay from the Pacific ocean. The area within the political district is 42 sq. m., of which considerable portions are drifting sand and rocky hills, rising in several points to an elevation of 800 ft. Goat island, Alcatraz island, and Mission rock in the bay, and the Farallon islands in the ocean, 30 m. off, also belong to the city and county. The city stands on the E. slope and at the base of high hills. In 1846 these hills were steep and cut up by

numerous gullies, and the low ground at their base was narrow, save in what is now the S. part of the city, where there was a succession of hills of loose, barren sand, impassable for loaded wagons. In front of the town of Yerba Buena, as it was called previous to 1847, was a cove extending $\frac{1}{2}$ m. into the land and 1 m. wide between the projecting points of land known as Clark's point and Rincon point. Along the front line of this cove the water was 40 ft. deep, and around its edges there were mud flats which were bare at low tide. The sand ridges have been cut away, the gullies and hollows filled up, the hills cut down, and the cove filled in; and where large ships rode at anchor in 1849 are now paved streets. The country around the city is bare, with no trees and little fertile land within 20 m. The greater part of the peninsula is hilly and unfit for cultivation. There is but one road leading out of the city. The business streets are built up densely, but beyond that the houses are scattered at considerable intervals, and the settled part of the city may be said to cover an area of 9 sq. m. In the N. E. corner of the city is Telegraph hill, 294 ft. high; in the S. E. corner Rincon hill, 120 ft.; and on the W. side Russian hill, 360 ft. The densely settled streets are in the amphitheatre formed by the three hills. On account of the hills, some of which have been entirely cut down, the city has been laid off in different surveys not uniform with each other in the size of the blocks or the course of the streets; but in each survey, with rare exceptions, the streets are straight and cross each other at right angles. The principal retail shops are in Kearny, Market, and Montgomery streets, which are the most fashionable promenades; the banks and brokers' offices are in California street; the importers and jobbers are in Front, Sansome, and Battery streets; the principal fashionable residences are in Van Ness avenue, Pine street hill, and Taylor, Bush, Sutter, Post, Geary, and O'Farrell streets; and the Chinese quarter comprises portions of Sacramento, Commercial, Dupont, Pacific, and Jackson streets. The busiest streets are paved with Belgian block and cobble stones, and most of the residence streets are planked. The city is supplied with gas made from imported coal, and water is brought from Pilarcitos creek near the base of the peninsula, by a conduit 30 m. long; the supply at present is about 20,000,000 gallons a day. In February, 1875, there were in the city 23,700 buildings, of which 4,300 were of brick; the remainder were of wood, with the exception of perhaps half a dozen of adobe and as many of stone. The buildings erected in 1874 numbered 1,389, and cost \$9,344,000. The most notable buildings are the Palace hotel, Nevada bank, bank of California, merchants' exchange, Safe Deposit bank, Lick house, Occidental hotel, Grand hotel, Cosmopolitan hotel, custom house, mint, mercantile library, California theatre, grand opera house, a new

theatre not yet named, and the unfinished city hall. James Lick, a pioneer citizen, has given his property, valued at several million dollars, to trustees with instructions to erect various institutions that will contribute to science, art, and philanthropy, as well as ornament the city. The Palace hotel, the largest building of the kind in the world and the most complete in its appointments, is 275 by 350 ft. on the ground, nine stories high (counting two below the level of the street), can accommodate 1,200 guests, and cost with land and furniture \$3,250,000. The Occidental and Cosmopolitan hotels can each accommodate 400, the Lick house 350, and the Grand hotel 300. In the S. part of the city, 3 m. from the city hall, are the buildings of the old mission of San Francisco. The main structure is the church, built of adobe in 1778. Four miles W. of the city hall, and on the S. shore of the Golden Gate or entrance to the bay, is Fort

point, the chief defence of the entrance, which is there 1 m. wide. Alcatraz island, which contains another fortification, commanding both the entrance and the city, is 2 m. N. of the city hall. Although the city is on a sandy, rocky, treeless peninsula, with a site so ill fitted by nature for its present purposes that \$50,000,000 have been spent in grading, still it has much attractive scenery in its vicinity. The Golden Gate park contains 1,043 acres, and the Lone Mountain cemetery has in many respects no superior. Bridges each a mile long span Mission and Islais coves. The climate is peculiar. The mean temperature of January is 49°, and of July 57°. Furs are often seen in the streets in August, and snow is never seen in December. People go to San Francisco from the interior of the state to escape from the heat of summer, and the number of days so warm that the shade is necessary for comfort does not exceed a dozen in a year. As



New City Hall.

severe frost is unknown, tropical and subtropical plants need no shelter. The people are ruddier and stouter than Americans generally. —The growth of San Francisco has been unprecedented. In 1846 the population was 600; in the spring of 1848, when the gold fever broke out, it was 1,000; in 1852 a state census reported 34,870; the federal census in 1860 gave 56,802, but there were probably 70,000; according to the federal census of 1870 there were then 149,473; and in February, 1875, the number was estimated by local authorities at 230,000. Included in the last number were 83,956 white males over 21 years of age, 44,000 white females over 18, 43,573 white males under 21, 37,804 white females under 18, 19,000 Chinese, and 1,800 colored persons. In 1874, according to the city school census, there were 60,552 persons under 17 years of age, and of these 35,000 were between 6 and 17; 40,056 were born of foreign parents, 12,230 of native parents, and 5,956 of mixed

parentage. In 1870, according to the census, half the inhabitants were foreign, of whom 36 per cent. were Irish, 14 per cent. German, 13 per cent. Chinese, 9 per cent. English and Welsh, and 6 per cent. French, and the rest Scandinavians, Dalmatians, Spanish Americans, &c. Of the natives, 50 per cent., mostly children, were born in California, 16 per cent. in New York, 10 per cent. in Massachusetts, 3 per cent. in Maine, and some in every other state of the Union. There are German, French, Spanish, Italian, and Chinese newspapers, and Irish, German, French, Italian, Spanish American, Scandinavian, Dalmatian, Swiss, Dutch, and Chinese benevolent societies.—The only railroad terminating within the city limits is the Southern Pacific; the Central Pacific terminates at Oakland on the E. side of San Francisco bay, and the California Pacific and San Francisco and North Pacific lines terminate on San Pablo bay N. of the city. Ferry steamers ply to these points. There are eight

street railroads, with 45 m. of track. About 50 ocean steamers run from the port in regular lines to Japan, Australia, Panama, Mexico, Victoria, and domestic ports in Oregon and California, and a score of light steamers to various ports on the inland waters that have their outlet at the Golden Gate. In 1874 San Francisco exported \$30,000,000 of treasure, including \$20,000,000 to New York, \$8,000,000 to China, \$437,000 to Central America, \$400,000 to Peru, \$184,000 to England, and \$41,000 to Japan. The merchandise exports by sea in the same period were valued at \$27,000,000, including \$16,000,000 to Great Britain, \$1,668,000 to China, \$690,000 to Japan, \$1,000,000 to Mexico, \$453,000 to Central America, \$340,000 to Peru, \$450,000 to the Hawaiian islands, \$290,000 to the Society islands, \$382,000 to Australia, \$137,000 to New Zealand, \$693,000 to British Columbia, \$560,000 to France, \$339,000 to Germany, \$1,195,000 to Russian ports in Asia, and \$196,000 to the East Indies. The value of the principal articles of export was as follows: wheat (500,000 tons), \$14,000,000; flour, \$2,900,000; barley, \$289,000; oats, \$131,000; wines, \$600,000; quicksilver, \$711,000. There were also exported 18,000 tons of wool. The imports by sea included 261,000,000 ft. of lumber, 18,000 boxes of candles, 60,000 barrels of cement, 37,000 tons of English coal, 139,000 tons of Australian coal, 15,000 tons of Cumberland coal, 51,000 tons of Vancouver island coal, 11,000,000 lbs. of coffee, 34,000,000 lbs. of rice, 8,000,000 lbs. of tea, 71,000,000 lbs. of sugar, 355,000 fire brick, 28,000 boxes of fresh Oregon apples, 16,000 boxes of raisins, 214,000 kegs of nails, 305,000 cases of coal oil, and 34,000 cases, 8,000 baskets, and 15,000 casks (various sizes) of wine. The imports by rail were also large, and included some of the same classes of articles. The number of sea-going vessels that arrived was 4,204, with an aggregate measurement of 1,553,000 tons, of which nearly half came from Europe and New York. The sum of \$7,898,000 was paid for federal duties, and \$2,488,000 for internal revenue duties. The coinage was \$27,000,000. The sales of mining stock in the board of brokers amounted to \$260,000,000, and of real estate within the limits of the city to \$23,000,000. The site and some other circumstances of the city are unfavorable to manufacturing industry, but in the matter of climate and Chinese population, and in some other points, it has great advantages; and it has many important manufacturing establishments, including woollen and silk mills, and manufactories of watches, carriages, boots, furniture, candles, acids, soap, wire work, castings of iron and brass, and silver ware. San Francisco is the centre of great wealth and the home of many millionaires. Many of the mines of gold, silver, quicksilver, and coal, the deposits of borax and sulphur, the quarries of granite, marble, trap, slate, and steatite, the mining and irrigating ditches, the

railways and macadamized roads, the quartz mills and saw mills, the vineyards, farms, orchards, and ranchos, from Arizona to Idaho, and from the Pacific to the Rocky mountains, are owned here. The wealth of the city probably amounts to \$500,000,000; the assessed value of the property within its limits is about half that sum. The capital and deposits of the savings banks are \$55,000,000, and of the commercial banks \$25,000,000. The city owes much of its prosperity to the Comstock lode in Nevada, which pays about \$12,000,000 of annual dividends, and yields a considerable profit also upon the sales of mining stock, in which people from all parts of the coast speculate.—San Francisco is governed by a mayor and a board of supervisors of 12 members (one from each ward), elected for two years. The members of the board of education (one from each ward) are also elected biennially. The regular police force consists of 150 men. There is a paid fire department, with 11 steam engine companies, 5 hose companies, 3 hook and ladder companies, and a fire-alarm telegraph. The annual expenditures of the city government are \$3,500,000, including \$650,000 for schools, \$400,000 for interest and sinking fund of the debt, \$229,000 for street lights, \$224,000 for the fire department, \$190,000 for the police, and as much more for the hospital. The entire debt is \$4,162,000, less relatively than that of any other large American city. The taxation for city and state purposes in 1874 amounted to \$5,543,000. Among the charitable institutions are the United States marine hospital, the city hospital, the pest house, the almshouse (all government institutions), the woman's hospital, the lying-in hospital, and the hospitals of the sisters of mercy and of the French and German benevolent societies. There are 87 benevolent societies meeting openly, besides numerous secret societies that are at least partially benevolent in character. The public schools accommodate 30,000 pupils in regular attendance. The mercantile library has 40,000 volumes, the mechanics' institute library 30,000, the odd fellows' library 25,000, and the law library 15,000. There are an academy of sciences, a school of design, two medical colleges, and three academic institutions. The number of newspapers and periodicals is 75, viz.: 11 daily, 1 tri-weekly, 2 semi-weekly, 40 weekly, 1 bi-weekly, 2 semi-monthly, and 18 monthly. Of churches, the Methodists, Presbyterians, and Catholics have each 13; the Baptists, Episcopalians, and Lutherans each 7; the Congregationalists and Jews each 5; the Swedenborgians 2; and the Unitarians and Universalists each 1. In seven the German language is used, and the Russian, French, Spanish, and Swedish in one each.—The mission of San Francisco de Asis, frequently called the mission Dolores, was founded Oct. 9, 1776, by two Franciscan monks, Francisco Palou and Benito Cambon, natives of Spain. Their establishment grew, and in 1825 it had

76,000 head of neat cattle, 79,000 sheep, 3,000 horses, 18,000 bushels of wheat and barley, merchandise worth \$35,000, \$25,000 in cash, and about 1,800 Indians. For 58 years the missionaries had complete control of the mission, and it prospered without interruption until in 1834 the missions of California were secularized and given over to civil officers. Their downfall was then most rapid, and in a few years nothing remained save the adobe buildings. One of the first effects of the new policy of secularizing the missions, placing the country under the control of the civil powers, and encouraging colonization, was the establishment of the village of Yerba Buena, near the present site of the city hall. The first house was erected in 1835, and others followed slowly. The first survey of streets and town lots was made in 1839. A small trade was done in exporting hides, selling wheat to the Russians, furnishing supplies to whalers, and trading with the *rancheros* in the neighborhood. Very few vessels entered the harbor. In midsummer of 1846 an American man-of-war took possession of the place in the name of the United States. The town was known only as Yerba Buena until Jan. 30, 1847, when the *ayuntamiento* or town council changed it to San Francisco. On the discovery of gold in the spring of 1848 the town was deserted by many of its inhabitants from June to October; but the return of the adventurers in the autumn, the arrival of others from abroad, the increase of shipping, the abundance of money, and the profits of trade soon built up a city, and in 1849 San Francisco had become a great centre of commerce. But the houses were crowded together and built of combustible materials, and several great fires occurred; the first was on Dec. 24, 1849, when the estimated loss was \$1,000,000; the next on May 4, 1850, loss \$3,000,000; the third on June 14 of the same year, loss \$3,000,000; the fourth on May 2, 1851, loss \$7,000,000; the fifth on June 22, 1851, loss \$2,000,000. Yet these fires scarcely interrupted the prosperity of the place. It continued to grow rapidly until January, 1854, when, in consequence of over speculation in land, of a decline in the gold yield, and of the temporary decrease of shipping (the last the result of the home production instead of the importation of food), the business of the city became less profitable. The title to much of the land was in litigation; many houses were unoccupied; and the depression did not cease till August, 1858, when a new era of prosperity began, and the growth of the city has since been steady, notwithstanding a real estate panic, which, following immoderate expectations of the benefits to accrue from the Pacific railroad, began in May, 1869, and lasted four years. The city was incorporated in 1850, and the city and county were consolidated in 1856. In 1851 and 1856, in consequence of bad municipal government and corrupt administration of the criminal laws,

the people organized vigilance committees, and executed several criminals. (See CALIFORNIA.)

SAN FRANCISCO BAY, a sheet of water in California, connected with the Pacific ocean by a strait 5 m. long and 1 m. wide, called the Golden Gate, in lat. 37° 48' N., lon. 122° 30' W. It extends S. S. W. about 40 m., being separated from the Pacific by a peninsula from 6 to 15 m. wide, on the N. extremity of which is the city of San Francisco. The bay opposite the city is about 7 m. wide, and in its widest part 12 m. The shores of the Golden Gate are bold and rocky, rising on the north in some places nearly 2,000 ft., while on the south the hills are from 300 to 400 ft. high, many of them being covered with shifting white sand. On the bar there is 30 ft. of water at low tide; within there is a much greater depth and good anchorage. The principal islands are Alcatraz, in the middle of the channel, about 4 m. from the entrance; Angel, the largest, containing 800 acres; and Yerba Buena or Goat island, opposite the city. There is a fortification on Alcatraz island, and another at Fort point on the S. side of the Golden Gate. San Francisco bay is connected on the north by a strait 3 m. wide with San Pablo bay, which is nearly round and about 10 m. in diameter; and this receives from the east through Carquinez strait (1 m. wide) the waters of Suisun bay, which is about 8 m. long from E. to W. and 4 m. wide. San Pablo and Suisun bays are deep, but Carquinez strait has only 16 ft. of water at low tide. At the head of San Pablo bay is Napa or Mare island, on which is a United States navy yard. The Sacramento and San Joaquin rivers, which drain the great valley between the Sierra Nevada and Coast mountains, discharge into Suisun bay. The name San Francisco bay is often extended over San Pablo bay.

SANGAMON, a central county of Illinois, intersected by the Sangamon river, and traversed by several important railroads; area, 936 sq. m.; pop. in 1870, 46,352. The surface is mostly level prairie land diversified with forests of good timber. Bituminous coal is found in abundance. The chief productions in 1870 were 336,962 bushels of wheat, 4,388,763 of Indian corn, 397,718 of oats, 187,494 of potatoes, 50,682 tons of hay, 117,736 lbs. of wool, 554,196 of butter, and 58,487 of honey. There were 16,395 horses, 3,046 mules and asses, 8,897 milch cows, 26,219 other cattle, 29,749 sheep, and 76,429 swine; 5 manufactories of agricultural implements, 28 of carriages and wagons, 2 of iron castings, 2 of engines and boilers, 14 of saddlery and harness, 1 woollen mill, 15 flour mills, and 7 saw mills. Capital, Springfield, also the capital of the state.

SANGUINARIA. See BLOODROOT.

SANHEDRIM (accurately, *sanhedrin*, a Heb. word formed from the Gr. συνέδριον, assembly), the supreme council of the Jews in later times. Traditionally its origin is traced to the 70 elders appointed by Moses, but its Greek

name and the absence of earlier historic mention point to a time after the Macedonian supremacy. Its full development was under the earlier Asmoneans; and Herod, when procurator of Galilee, was summoned before the sanhedrim, charged with usurping its authority in sentencing men to death. Its members were chosen from the chief priests, elders, and scholars; and the tradition is that there were 70 besides the *nasi* or president. There was a vice president, who was called "father of the council." The usual meeting place was a hall called *lishkath haggazith* (hewn-stone chamber) within the temple enclosure. Before it Jesus was arraigned as a false prophet, and Peter, John, Stephen, and Paul as false teachers. Its power was nearly destroyed by Herod the Great, who put to death almost all its members. The Talmud also mentions a lesser sanhedrim of 23 members in every city of Palestine in which there were as many as 120 families.

SANILAC, an E. county of Michigan, bordering on Lake Huron and drained by the head streams of Black and Cass rivers; area, about 1,000 sq. m.; pop. in 1874, 16,292. It has an undulating and well timbered surface, and a moderately fertile soil. The chief productions in 1870 were 112,055 bushels of wheat, 49,782 of peas and beans, 145,396 of oats, 103,990 of potatoes, 14,901 tons of hay, 32,593 lbs. of wool, 250,832 of butter, and 32,999 of maple sugar. There were 1,941 horses, 3,265 milch cows, 1,419 working oxen, 3,700 other cattle, 9,182 sheep, and 3,760 swine; 4 flour mills, 16 saw mills, 5 manufactories of carriages and wagons, and 3 of furniture. Capital, Lexington.

SAN JACINTO, a river of Texas, rising in Walker co. and flowing S. S. E. into San Jacinto bay, an arm of Galveston bay; length about 120 m., of which 45 m. are navigable. It is deep and clear. Near its mouth, on April 21, 1836, was fought the decisive battle of San Jacinto. (See HOUSTON, SAM.)

SAN JACINTO, a S. E. county of Texas, bounded N. E. by Trinity river, and drained by small tributaries of the San Jacinto; area, about 500 sq. m. It has been formed since the census of 1870. The surface is undulating and the soil very productive. Capital, Cold Spring.

SAN JOAQUIN, a river of California, which rises in the Sierra Nevada mountains, in Fresno co., flows S. W. to the W. part of the county, and thence N. W. through Fresno, Merced, Stanislaus, and San Joaquin counties, and uniting with the Sacramento empties into Suisun bay, which through San Pablo and San Francisco bays communicates with the Pacific ocean. Tulare lake discharges into it at high water, and the river was formerly considered to rise in it. Its entire length is about 350 m. It is navigable at all seasons by vessels of from 150 to 250 tons to Stockton, about 50 m. above its mouth; in winter and spring steamers ascend nearly 200 m. further. It receives numerous tributaries from the Sierra Nevada, the chief

of which are the Fresno, Mariposa, Merced, Tuolumne, Stanislaus, and Calaveras. Its valley is noted for its fertility, producing great quantities of wheat and barley.

SAN JOAQUIN, a central county of California, intersected by the San Joaquin river, which here receives the Mokelumne, and bounded N. by the Calaveras and S. E. by the Stanislaus, tributaries of the San Joaquin; area, 1,452 sq. m.; pop. in 1870, 21,050, of whom 1,629 were Chinese. It lies between the foot hills of the Sierra Nevada and Coast ranges, but the surface is generally level, and a large portion of it treeless. Part of the extensive tract of tule marsh in the northwest has been reclaimed. The main line and Visalia division of the Central Pacific railroad and the Stockton and Copperopolis and Stockton and Visalia railroads traverse it. The chief productions in 1870 were 2,360,925 bushels of wheat, 37,350 of Indian corn, 1,027,016 of barley, 21,165 gallons of wine, 86,760 lbs. of wool, 292,060 of butter, 25,111 of cheese, and 41,214 tons of hay. There were 14,189 horses, 6,999 milch cows, 14,373 other cattle, 79,889 sheep, and 27,937 swine; 3 manufactories of agricultural implements, 6 of carriages and wagons, 2 of iron castings, 3 of machinery, 13 of saddlery and harness, 3 breweries, 1 tannery, and 2 flour mills. Capital, Stockton.

SAN JOSÉ, a city and the county seat of Santa Clara co., California, at the intersection of the Southern Pacific railroad with the San José branch of the Central Pacific line, 8 m. S. E. of San Francisco bay, and 40 m. S. E. of San Francisco; pop. in 1870, 9,089, of whom 3,755 were foreigners, including 714 Chinese; in 1875, estimated by local authorities at 15,000. The main portion of the city occupies a gently rising plateau, between the Coyote and Guadalupe rivers (small streams emptying into the bay), here $1\frac{1}{2}$ m. apart, with suburbs extending some distance beyond them. It is handsomely laid out, lighted with gas, and well supplied with water, and has a good fire department. Horse cars run through the main streets. The principal public buildings are the court house, a massive Corinthian structure costing \$200,000, with a dome commanding a fine view; the jail adjoining it, the finest in the state, costing \$80,000; the state normal school building, in the centre of Washington square, erected at a cost of more than \$200,000; the city hall; two markets, costing more than \$40,000 each; eight public school buildings; and ten churches, the largest and most expensive being an unfinished edifice belonging to the Roman Catholics. There are three public parks, containing 2, 8, and 30 acres respectively. The city owns a tract of 400 acres in Penitencia cañon, 7 m. E., reserved for a public park, containing a wild rocky gorge with a mountain stream and a variety of mineral springs. The climate is mild and equable, and the surrounding country yields grain and fruits abundantly. Slight earthquake shocks are not uncommon. The

city contains a woollen mill, three founderies and machine shops, three flouring mills, three planing mills, five or six carriage factories, three breweries, three distilleries, two large fruit-drying establishments, one fruit-canning establishment, three candy factories, two glove factories, a broom factory, a tannery, a starch factory, and a furniture factory. The banking institutions are a national gold bank and three banks of discount and deposit, with savings departments; aggregate capital, \$2,350,000. The public schools are graded. The college of Notre Dame (Roman Catholic), a day and boarding school for girls, founded in 1851 and incorporated in 1855, has a fine building and extensive grounds. The San José institute and business college, a day and boarding school for both sexes, founded in 1862, has commodious buildings. At Santa Clara, 3 m. W., is Santa Clara college, under the management of the Jesuits, founded in 1851 and incorporated in 1855. It occupies a number of elegant buildings in an enclosure of about 12 acres. Between Santa Clara and the city is the university of the Pacific (Methodist Episcopal), connected with which is a young ladies' seminary. The university was founded in 1852, and has been recently removed from Santa Clara. San José has an opera house seating 1,200, and an elegant and commodious music hall. The San José library association, incorporated in 1872, has 4,000 volumes. Three daily and three weekly newspapers and a monthly periodical are published. There are Baptist, Episcopal, Friends', Jewish, Methodist, Presbyterian, and Roman Catholic churches, and a Unitarian society.—San José was settled by the Spaniards before 1800, but remained merely a collection of adobe huts till after the cession of the country to the United States. The legislature of California held its first session here in the winter of 1849-'50, and assembled here again the following winter, but soon removed to Vallejo.

SAN JOSÉ, a city and the capital of the republic of Costa Rica, near the head waters of the Rio Grande, almost midway between the Atlantic and the Pacific; lat. $9^{\circ} 54' N.$, lon. $84^{\circ} 3' W.$; pop. about 26,000. It lies in a picturesque valley, 4,500 ft. above the sea, formed between the Herradura mountains on the south and those of Barba on the north. Its streets are laid out with great regularity, but the buildings are low and unimposing. Among the best of the latter are the cathedral, the episcopal palace, and the government buildings. A railway is in course of construction (1875) to connect it with Punta Arenas, its port on the Pacific, and with Limon on the Atlantic. The national bank of Costa Rica was established here in 1873, with a capital of \$2,000,000. San José became the seat of government after the destruction of Cartago, the former capital, by an earthquake, Sept. 2, 1841.

SAN JUAN, an island of Washington territory, in Washington sound, between the gulf

of Georgia on the north, the strait of Fuca on the south, Rosario strait on the east, and the canal de Haro on the west, about lat. $48^{\circ} 30' N.$, lon. $123^{\circ} W.$; length 15 m., greatest breadth 7 m.; area, about 60 sq. m.; pop. in 1870, 376, including the American garrison of 98 men, but exclusive of the British garrison. The N. part is mountainous and heavily timbered; the S. part has many beautiful and fertile prairies, and excellent pasturage. Coal and limestone are found. The adjacent waters abound in cod, halibut, salmon, and other fish. This and several smaller islands were included in Whatcom co. till 1873, when they were formed into the county of San Juan. The largest of the other islands are Orcas, about 60 sq. m., and Lopez, about 80 sq. m. The rest have an aggregate area of about 50 sq. m., the principal being Blakely, Decatur, Shaw, Waldron, Henry, Spieden, Stuart, and Sucia. Total area of the county, about 200 sq. m. The population of Orcas island in 1870 was 108; of Lopez, 48; of the others, except San Juan, 22; and of the entire group, 554, including 72 Indians; white population in 1874, 545.—San Juan derives its chief importance from the dispute respecting its possession between Great Britain and the United States. The treaty of June 15, 1846, for the settlement of the Oregon boundary, fixed upon the 49th parallel as the line to "the middle of the channel which separates the continent from Vancouver island, and thence southerly through the middle of said channel and of Fuca's straits to the Pacific ocean." Subsequently Great Britain claimed that Rosario strait was the channel intended, while the United States insisted upon the canal de Haro, leaving Washington sound with its numerous islands in dispute. In November, 1859, an arrangement was entered into between the two governments for a temporary joint military occupation, in pursuance of which a British garrison was established in the N. part and an American garrison in the S. By article 34 of the treaty of Washington, May 8, 1871, the question in dispute was referred to the arbitration of the emperor of Germany, who in October, 1872, decided in favor of the United States; and in the following month the British garrison was withdrawn.—See vol. v. of "Papers relating to the Treaty of Washington," published by the department of state (1872).

SAN JUAN DE NICARAGUA, *San Juan del Norte*, or *Greytown*, a port of Nicaragua, on a promontory near the mouth of the river San Juan, on the Caribbean sea, in lat. $10^{\circ} 56' N.$, lon., $83^{\circ} 45' W.$; pop. about 300. The houses, none of which have more than two stories, are now in a state of decay. San Juan derives its chief importance from being the principal port of Nicaragua on its E. coast. It was occupied by a British force in 1848 as belonging to the "Mosquito kingdom," became prominent as the terminus of the Nicaragua transit in 1853, when its inhabitants organized an independent

municipal government, and was secured to Nicaragua by treaty with Great Britain in 1860. It was bombarded in 1854 by a naval force of the United States, on a charge that its inhabitants had infringed upon the rights of the transit company. Since then its harbor has become nearly choked with sand.

SAN JUAN DE PUERTO RICO, a fortified city, capital of the island of Porto Rico, on a small island off the N. coast; lat. $18^{\circ} 29' N.$, lon. $66^{\circ} 7' W.$; pop. about 20,000. The streets are regularly laid out, well kept, and lighted with gas. The public buildings are the old government house, the royal military hospital, the bishop's palace and seminary, a large cathedral, an arsenal, custom house, city hall, and several fine castles, now used as barracks. There are a house of refuge and instruction for the indigent, an insane asylum, and other benevolent institutions. San Juan has several primary schools, a college in course of construction (1875), and a fine library. The port is difficult of access, but is considered one of the most important in the Antilles, and a direct trade has recently been established with Europe and the United States. It is regularly visited by the steamers of the British lines frequenting the West Indies. The principal exports are sugar, mostly to the United States, coffee to Germany, and some tobacco.

SAN JUAN RIVER. See NICARAGUA.

SAN LUCAR DE BARRAMEDA, a city of Andalusia, Spain, situated in a barren district at the mouth of the Guadalquivir, in the province and 18 m. N. by W. of the city of Cadiz; pop. about 16,000. It contains many churches and convents, and a hospital founded in 1517 by Henry VIII. of England for British sailors. Cotton and silk goods, leather, soap, and barrilla are manufactured. The chief export is wine. It serves as a seaport to Seville.

SAN LUIS. **I.** A central province of the Argentine Republic, bordering on La Rioja, Cordova, the pampas W. of Buenos Ayres, Mendoza, and San Juan; area, 20,000 sq. m.; pop. in 1869, 52,761. In the north it is mountainous, with several high peaks. The southern districts abound in excellent pasture lands, on which are reared large numbers of cattle. The Rio Quinto is the only river of importance. There are some lakes, the largest of which is the Bebedero, of considerable extent, and supplying salt for the whole province. Much rain falls. The soil is favorable for the cultivation of all the European products. Oranges and grapes are especially abundant, and large quantities of excellent wines are made. The chief articles of commerce are hides, sheep and guanaco wool, skins, leather, ostrich and condor feathers, gold, auriferous copper, precious stones, and salt. Of 14,576 children from 6 to 14 years of age, 2,600 attended school in 1869. The province is divided into eight departments. **II.** A city, the capital of the province, 460 m. W. N. W. of Buenos Ayres; pop. in 1869, 3,748. It is beautifully situated at

an elevation of about 2,500 ft., with a mild climate. The chief industries are agriculture and the manufacture of wines. The city, sometimes called San Luis de la Punta, was founded by Luis Loyola in 1596.

SAN LUIS OBISPO, a S. W. county of California, bounded W. by the Pacific, E. by the Coast range, and S. by the Guaymas or Santa Maria river, and drained by the head waters of Salinas or Buenaventura river; area, about 3,000 sq. m.; pop. in 1870, 4,772, of whom 59 were Chinese. The surface is partly mountainous, and the soil fertile. Gold, silver, coal, and limestone are found; there are bituminous springs, and a celebrated warm sulphur spring. The chief productions in 1870 were 38,864 bushels of wheat, 25,982 of Indian corn, 126,604 of barley, 16,519 of peas and beans, 903,863 lbs. of wool, 156,340 of butter, 341,259 of cheese, and 5,714 tons of hay. There were 4,485 horses, 4,813 milch cows, 15,899 other cattle, 191,909 sheep, and 3,319 swine. Capital, San Luis Obispo.

SAN LUIS POTOSI. **I.** An E. state of Mexico, bounded N. E. by Nuevo Leon, E. by Tamaulipas and Vera Cruz, S. by Hidalgo, Querétaro, and Guanajuato, and W. and N. W. by Zacatecas; area, 28,889 sq. m.; pop. in 1869, 476,500. In the southeast the surface is flat, but in other directions it becomes broken and hilly, terminating in mountains and a high table land in the west. The most important rivers are the Santander and Tampico. Large crops of wheat, maize, and barley are raised, and great numbers of cattle are reared. There are several copper mines. The manufactures include woollen and cotton goods, glass, leather, earthenware, and hardware. **II.** A city, capital of the state, upward of 6,000 ft. above the sea, 220 m. N. W. of Mexico, and 100 m. S. E. of Zacatecas; pop. in 1869, 31,389. It has six handsome churches, three convents, a hospital, a government house, and several schools, and manufactories of shoes, hats, and hardware.

SAN MARINO. **I.** A republic in N. E. Italy, the oldest and next to Monaco the smallest state in Europe; area, 22 sq. m.; pop. in 1874, 7,816. It is surrounded by the provinces of Forli and Pesaro ed Urbino, is mountainous, and has four or five villages. Wine, silk, and fruits are the principal products. It was settled, according to tradition, in the 4th century by Marinus, a Dalmatian hermit, and has ever since the establishment of its government remained independent. The legislature consists of a council of 60, taken equally from the ranks of nobles, burgesses, and small proprietors, and appointed for life by the councillors themselves. An executive body of 12 is selected from this number; two presidents (*capitani reggenti*) are chosen every six months, and justice is administered by two foreign magistrates appointed for three years. The annual revenue is about \$14,000. In 1874 the harboring in San Marino of fugitives from justice led to complications with the Italian gov-

ernment. **II.** A city, capital of the republic, 8 m. S. W. of Rimini; pop. about 6,000. It is situated on the summit of a rugged mountain, and contains a remarkable cabinet of medals, a theatre, five churches, two convents, a town house, and a statue of Marinus.

SAN MARTIN, José de, an Argentine general, born at Yapeyú, Feb. 25, 1778, died in Boulogne, France, Aug. 17, 1850. He received a military education in Spain, served with distinction at Baylen, and became a colonel in the Spanish army. He returned to South America on the outbreak of the war of independence, and organized the Argentine forces. After repeated victories over the royalists, he was made in 1814 commander-in-chief of the ill-fated expedition to Upper Peru against the troops of the viceroy of Lima. Withdrawing to the province of Cuyo, he soon raised an army, with which he crossed the Chilian Andes, and defeated the royalists under Osorio in the battle of Chacabuco, Feb. 12, 1817. Declining the presidency of Chili, he defeated the Spaniards again at Maypu, April 5, 1818, and Chilian independence was secured. In 1820 he marched into Peru, accompanied by Bernard O'Higgins, president of Chili, entered Lima, drove the Spaniards into the interior, declared Peru independent (1821), and assumed the dignity of protector, which he was forced to resign in 1822. Having retired to private life, he went to Europe, and lived in England, the Netherlands, and France.

SAN MATEO, a W. county of California, bordering on the Pacific, and bounded N. E. by the bay of San Francisco; area, 432 sq. m.; pop. in 1870, 6,635, of whom 519 were Chinese. The surface is hilly and well timbered, and the soil fertile. Excellent coal is found, and there are mineral springs of sulphur and iron. It is traversed by the Southern Pacific railroad. The chief productions in 1870 were 107,049 bushels of wheat, 294,318 of oats, 171,207 of barley, 329,875 of potatoes, 285,460 lbs. of butter, 469,295 of cheese, and 19,065 tons of hay. There were 3,238 horses, 5,140 milch cows, 4,688 other cattle, 6,535 sheep, and 5,829 swine; 2 flour mills, 1 tannery, and 11 saw mills. Capital, Redwood City.

SAN MIGUEL, an E. county of New Mexico, bordering on Texas, intersected by the Rio Pecos and Canadian river, and watered by their tributaries; area, about 10,800 sq. m.; pop. in 1870, 16,058. A S. projection of this county divides Bernalillo and Valencia counties into two parts. The N. W. portion is mountainous. The chief productions in 1870 were 13,321 bushels of wheat, 83,145 of Indian corn, 186,626 lbs. of wool, 18,650 of cheese, and 1,747 tons of hay. There were 649 horses, 979 mules and asses, 4,834 milch cows, 3,236 working oxen, 4,571 other cattle, 194,309 sheep, and 549 swine; 4 flour mills, and 3 saw mills. Capital, Las Vegas.

SAN MIGUEL, a city of San Salvador, capital of a department of the same name, in a broad

and fertile plain, about 90 m. E. S. E. of the city of San Salvador; pop. about 12,000. It is the most important trading town in Central America. The great fair of La Paz is held here every year. About 5 m. W. of the city is a volcano of the same name, 6,680 ft. high, rising abruptly from the plain, which sends out great volumes of smoke, and occasional eruptions open vast fissures in its sides.

SAN MIGUEL, Evariste, a Spanish general, born in Gijon in 1780, died in Madrid, May 29, 1862. He entered the army in 1808, became a lieutenant colonel, and was elected to the cortes. After the restoration of Ferdinand VII. he edited a liberal paper. In 1820 he served under Riego in the Andalusian expedition, and composed the "Hymn of Riego." He was banished to Zamora in 1821, but recalled in 1822, and made minister of foreign affairs. On the French invasion in 1823 he rejoined the army, was taken prisoner and exiled, and resided in England till 1834. Under the proclamation of a general amnesty he returned, and was for ten years a member of the cortes. In 1854 he became president of the revolutionary junta of Madrid, minister of war, field marshal, and provisional president of the cortes. He wrote several works on the history of his country.

SANNAZARO, or **San Nazaro, Jacopo**, an Italian poet, born in Naples in 1458, died there in 1530. His first poetical compositions obtained him the patronage of Frederick III. of Naples, whom he afterward followed into exile, returning to Naples only after the death of his benefactor, and declining the protection of Gonsalvo de Cordova. His chief works are: the *Arcadia* (4to, Venice, 1502; Naples, 1504; Milan, 1808), a pastoral romance, which had upward of 60 editions in the 16th century; his six *Elogæ* (published with the following), according to Paolo Giovio his most perfect work, in which the coast populations of Italy replace the shepherds of Virgil; and *De Partu Virginis Libri III.* (fol., Naples, 1526; Venice, 1528, 1535; Amsterdam, 1679, 1728), of which Hallam says: "It would be difficult to find its equal for purity, elegance, and harmony of versification."

SAN PATRICIO, a S. county of Texas, bounded N. E. by the Aransas river, S. W. by the Nueces, and S. by the gulf of Mexico; area, 625 sq. m.; pop. in 1870, 602, of whom 64 were colored. It has considerable good land, but is subject to summer droughts. Stock raising is the chief business. Nearly half the county is covered with mezquite and other trees. The chief productions in 1870 were 21,325 bushels of Indian corn, 9,010 of sweet potatoes, and 7,325 lbs. of wool. There were 4,973 horses, 30,828 cattle, 2,845 sheep, and 1,281 swine. Capital, San Patricio.

SAN PETE, an E. county of Utah, bordering on Colorado, and intersected by Green river; area, about 7,000 sq. m.; pop. in 1870, 6,786. The W. part is crossed by the Wahsatch moun-

tains, watered by the Sevier river, and has abundant timber and considerable land adapted to agriculture. In the east are numerous large but generally unoccupied valleys. The chief productions in 1870 were 91,443 bushels of wheat, 3,867 of Indian corn, 9,197 of oats, 5,256 of peas and beans, 58,655 of potatoes, 12,509 lbs. of wool, 61,887 of butter, and 4,084 tons of hay. There were 805 horses, 1,794 milch cows, 1,908 other cattle, 7,407 sheep, and 361 swine; 7 manufactories of furniture, 2 wool-carding establishments, 1 flour mill, and 11 saw mills. Capital, Manti.

SAN REMO, a town of Italy, in the province of Porto Maurizio, on the coast, 25 m. E. N. E. of Nice; pop. about 10,000. It is picturesquely situated on a declivity descending to the seashore, which is covered by a dense growth of olive trees. The streets are narrow and steep, and there are several ancient churches. The palazzo Garbarino contains Raphael's *Madonna della Rovere*. San Remo has become a rival of Nice and Mentone as a residence for invalids.

SAN ROQUE, a city of Andalusia, Spain, in the province and 57 m. S. E. of the city of Cadiz, near the head of the bay of Gibraltar; pop. about 8,000. There is trade in grain and provisions. Owing to its healthful situation on a rocky eminence, and the low price of living, it is frequented by summer visitors.

SAN SABA, a W. county of Texas, bounded N. and E. by the Colorado and intersected by the San Saba river; area, 1,100 sq. m.; pop. in 1870, 1,425, of whom 144 were colored. The surface is partly mountainous. There are sulphur springs in the S. E. part. The chief productions in 1870 were 49,710 bushels of wheat, 3,187 of sweet potatoes, 3,518 lbs. of wool, 3,090 of honey, and 1,870 gallons of molasses. There were 16,343 cattle, 1,465 sheep, and 5,394 swine. Capital, San Saba.

SAN SALVADOR. **I**. The smallest but most populous of the five republics of Central America, comprised between lat. 13° and 14° 30' N., and lon. 87° 30' and 90° 20' W., bounded N. and E. by Honduras, S. E. by Fonseca bay, S. by the Pacific, and N. W. by Guatemala; area, according to Squier, 9,600 sq. m., though most recent authorities give it at not more than 7,500 sq. m.; pop. estimated at 600,000, of whom 9,000 are whites, 300,000 Indians, 290,000 mestizoes, and 1,000 negroes. Except the extensive and safe port of La Union, on the W. shore of the bay of Fonseca, the harbors (Acajutla, La Libertad, and Jiquilisco) are merely open roadsteads. A narrow tract of low, rich, alluvial land, 20 m. wide, extends along the shore as far as La Libertad; further N. the coast is rising and broken. Several short mountain ranges of moderate height traverse the interior. About 12 to 15 m. from the coast are the volcanoes of Apaneca, 5,826 ft. high; Isalco, which is unceasingly active, 4,060 ft.; San Salvador, 7,376 ft.; San Vicente, 7,500 ft.; San Miguel, 6,680 ft.; Santa Ana, 6,615 ft.; Cojutepeque, 5,700 ft.; Tecapa, 5,200 ft.; Usu-

lutan, 4,250 ft.; Chinameca, 4,750 ft.; and Conchagua, 4,800 ft. The chief river is the Lempa, deep but rapid, about 150 m. long, principally fed by the lake of Guija, near the N. W. boundary of the state. Lake Ilopango, nearly in the centre of the state, is about 9 m. long and 3 m. wide. The soil is generally good, in some parts remarkably rich; but the frequent political dissensions have materially retarded agriculture. Considerable maize is planted; oranges, lemons, pineapples, and plantains are extensively grown; sugar, cacao, coffee, cotton, and tobacco yield bountiful crops. But indigo is by far the most important source of wealth, though the quantity raised has considerably diminished since the era of independence. The Balsam coast, where the balsam of Peru is collected, is W. of Point Libertad; the Indians collect annually about 20,000 lbs. Numerous fine cattle are raised. The hills are crossed by innumerable metallic veins, but the mineral wealth of the country is imperfectly developed, and the rich silver mines are almost entirely neglected; excellent iron ore is obtained near Metapa. The manufactures consist of coarse cotton goods, cutlery, and iron ware. Although warmer than Guatemala, the country is generally healthful, excepting the low tract along the coast. The republic is divided into the departments of San Miguel, San Vicente, La Paz (capital, Sacatecoluca), Chalatenango, Cuscatlan (capital, Suchitoto), San Salvador, Sonsonate, and Santa Ana, with capitals of the same names except in the two cases noted. San Salvador is the capital of the republic; and, besides it and the department capitals, there are 140 smaller towns and 62 villages. Fairs have been established by the government in different parts of the state; the principal one is held at San Miguel. The main article sold is indigo. In 1872 the imports amounted to \$3,000,000, and the exports to \$3,800,000. The public debt in 1869 was \$705,800, at 6 per cent. The president, whose term was formerly six years, is now elected every four years. The legislature consists of a senate with 12 members, and a house of representatives with 24 members, all elected for two years, half of the members being replaced by new ones every year. Every male citizen over 21 years old is entitled to vote, except domestic servants and those who are without a legal occupation, contract debts fraudulently, owe money past due to the state, enter the service of a foreign power, or are notoriously of bad character; foreigners may become naturalized after five years' residence. Ecclesiastics and soldiers in active service are debarred from civil government offices. The president as well as the representatives and senators must possess property of a specified value. Each department governor is elected for two years. The standing army consists of 1,000 men, and the militia of 5,000. Though the Roman Catholic church is recognized by the state, all other denominations are protected in

their worship. In education this republic excels the other states of Central America, and has a very well endowed university in the capital. Duties on imports, stamped paper, and the monopolies of tobacco and rum furnish the revenues.—When Pedro de Alvarado, the lieutenant of Cortes, invaded this region in 1524, it had a dense population and large, well built cities. In 1528 the city of San Salvador rose on the site of the ancient Cuscatlan, and under the Spanish rule the province became a flourishing portion of the kingdom of Guatemala. The independence of this part of the Spanish dominion was accomplished in 1821 almost without bloodshed. The present five republics constituted themselves as the confederated republic of Central America. When a violent effort was made to incorporate it with Mexico (under the emperor Iturbide), San Salvador decreed its annexation to the United States, but the fall of the Mexican empire re-established the Central American republic (1823), of which the city of San Salvador was made the capital. It became an independent commonwealth in 1839, and in 1856 assumed the title of republic. In all the revolutions of Central America, San Salvador, owing to its geographical position, has been compelled to take an active part. In 1862 a war broke out with Guatemala, which aimed at a supremacy over all Central America; but the troops of the latter state were repulsed, and a peace was effected in February, 1863. A second attempt at invasion by Guatemala in April, 1863, proved unsuccessful in the beginning, but ended with the capture of San Salvador by Carrera, president of Guatemala, in October. Barrios, president of San Salvador, was recalled from Panama in May, 1865, by the revolutionary party; but he was defeated and shot, after a trial by court martial. Duenas, provisionally elected in 1863, was reelected for four years in 1865, and continued in office till 1869. Under him the government endeavored to open the country, to construct and improve roads, and to build bridges and wharves. Gonzalez succeeded him as provisional president, and was reelected for four years in 1872, when a treaty of friendship and alliance was made between this republic and Guatemala.

II. A city, capital of the republic, on the Aselhuate, in lat. 13° 40' N., lon. 89° 5' W.; pop. about 16,000. It is situated in a delightful valley more than 2,000 ft. above the sea, about 3 m. S. E. of the volcano of San Salvador, famous for its numerous and disastrous eruptions. The streets are regularly laid out, and generally well kept. In the centre is a spacious plaza, on which before the late earthquake stood the cathedral, very large but of little architectural beauty, and three rows of handsome arcades. The other principal public buildings were eight churches, the university, a female seminary, a hospital, and two aqueducts. Fine sugar and indigo plantations abound in the vicinity, and there are numerous hot springs.

The chief industry is agriculture, the once extensive hardware and cotton manufactures having dwindled to comparative insignificance.—San Salvador was founded in 1528 by Jorge de Alvarado. It has frequently suffered from earthquakes, the most disastrous of which were that of April 16, 1854, when the city was almost completely destroyed, and a large number of the inhabitants (then numbering some 30,000) perished; and that of March 19, 1872, by which most of the public edifices and dwelling houses were thrown down, 50 persons killed, and more than 500 seriously injured. It was, however, resolved to rebuild the city on the same site, for the eighth time since its foundation. A new university and several public schools have been organized of late.

SAN SALVADOR, or **Cat Island**, an island of the Bahama group, 28 m. E. S. E. of Eleuthera; length nearly 50 m., breadth from 3 to 7 m.; pop. about 1,000. This island has generally been supposed to be Guanahani, the first land seen by Columbus in the new world (Oct. 12, 1492), and named by him San Salvador. Humboldt and Irving have defended this view, but Navarrete combats it and advocates the claims of Grand Turk island; and Watling island and Mayagana, of the same group, have been identified with Guanahani respectively by A. B. Becher ("Journal of the Royal Geographical Society," 1856) and F. A. de Varnhagen (*La verdadera Guanahani de Colon*, 1864). Becher's view has been adopted by Daniel, Petermann, and other eminent geographers.

SAN SALVADOR, a city of Brazil. See **BAHIA**.

SAN SEBASTIAN. See **SAINT SEBASTIAN**.

SANSKRIT, the literary language of the Hindoos, the Aryan inhabitants of India. Originally a vernacular dialect in Hindostan, it has for nearly or quite 2,000 years past been kept artificially in use, like the Latin in Europe, by the labors of grammarians and lexicographers, and the transmitted usages of an educated caste, to serve as the means of learned intercourse and composition. Its name (*saṁskṛta*, completed, perfected) denotes it as "the cultivated, elaborated, or perfected form of speech," in distinction from the uncultivated dialects, called Prakrit (*prakṛti*, nature), which sprang from or were contemporaneous with it. The importance and interest of the Sanskrit is twofold. Considered in its relation to Indian history, it contains an immense literature, laying open from a very remote epoch nearly to the present day the inward and outward life of a numerous and highly endowed branch of the human family (India still contains a seventh part of our race); and it is the most ancient and original of the Indo-European languages, and, by reason of its better conservation of the features of their common parent, throws vastly more light than any other upon the history and relations of all. The latter is the more widely appreciated side of its usefulness, and the one which has most contributed to give currency to its study. Its cultivation by Europeans dates less

than a century back, to the establishment of English supremacy in India, nor did it gain a foothold on European ground till after the beginning of the present century. The earliest translations of Sanskrit works were of the *Bhagavad-Gītā* in 1785, the *Hitopadesa* in 1787, and the *Sakuntalā* in 1789. Sir William Jones, and later Colebrooke and Wilson, were the Englishmen who did most in India to foster and advance the study; the Schlegels in Germany and Chézy in France were the first who introduced it upon the continent. Bopp (from 1830 onward) founded upon it the new science of the comparative grammar of the Indo-European languages, of which others before him had given but hints or fragments. Within 30 years the introduction of the Vedas to the knowledge of the world has made a new era in Sanskrit study. Hundreds of Sanskrit texts have been published in the East and in the West; translations from them, with grammars, glossaries, and other apparatus for the learner, are to be found in every cultivated language of Europe; all the considerable universities have instructors in Sanskrit, and its students are everywhere numerous.—The Sanskrit is ordinarily written in a character called *dēvanāgarī*, “divine city,” which, in its present fully developed form, is of a date several centuries later than the Christian era. The ancient alphabet from which it is descended was derived, according to the best opinion, from a Semitic source. Respecting the origin of writing there are not even any traditions in the Hindoo literature, as regards either its period or its place of derivation; and scholars are still at variance as to whether whole departments of the literature were composed before or after the knowledge of a written character. The earliest dated monuments known are those of the Buddhist monarch Priyadarsi, of the 3d century B. C.; their language is already Prakrit. The *dēvanāgarī* is written from left to right; it is a complete mode of writing, representing every analyzable sound by a separate sign; it is syllabic, each consonant implying a short *a*, if the sign of no other vowel is attached to it; if more consonants than one are to be spoken with one vowel, their signs are united into a single compound character. (See INDIA, RACES AND LANGUAGES OF, vol. ix., p. 217; and for the method employed in transcribing the sounds, see WRITING.) The completeness of this system of written signs, and its nice adaptation of sign to sound, are very evident. Not less evident is the richness of the system of sounds, and the harmony and proportion of its development. The spoken alphabet has the proper characteristics of an ancient and primitive system, lacking many of the later intermediate vowels, spirants, and the like, and the written alphabet, of course, is correspondingly defective; the English has at least five vowels (or nine, if long and short be counted as separate) and six consonants for which the Sanskrit alphabet has no signs. A peculiar

and striking feature of the external form of the Sanskrit is presented by its highly elaborate system of euphonic rules, which have play both in the formation and inflection of words, and also, in a yet more searching and extended manner, in the combination of words into a sentence. The ends sought are chiefly the avoidance of the hiatus and of the concurrence of surd and sonant letters, the assimilation of nearly kindred sounds, and the modification of combinations difficult of utterance; and the physical theory of most of the rules is readily traceable. As an illustration of the euphonic combination of the phrase, we take the words *indras apabharan apām garbhān charati apsu antar*; they form the sentence *indro 'pabharann apāṅ garbhāṅ charaty apsu antaḥ*. That there is something artificial and arbitrary in the strict application of the system of euphonic changes to the sentence is in itself highly probable, since we can hardly conceive that any people, in its ordinary use of language, should so sacrifice the independence of individual words to an exaggerated sense of euphony; and the probability becomes a certainty when we observe that in the Vedic poetry, the earliest and least artificial literature of the language, the euphonic rules, as is shown by the metre, are in great part unobserved. The accents are the acute and the circumflex, corresponding in value to those of the Greek. Neither is limited to any particular part of the word, like those of the Latin and Greek; it may stand, in a word of whatever length, on whatever syllable the rules of derivation or composition may direct. The circumflex but seldom rests on a simple long vowel; it belongs chiefly to a syllable whose vowel is preceded by a semi-vowel convertible into a vowel, as *krāḍ*, *nadyās*.—As regards the etymological part of grammar, the distinguishing characteristic of the Sanskrit is (besides the great affluence of forms, and the unlimited facility of forming new derivatives and new compounds) its remarkable preservation of original materials and processes, the great regularity and consequent transparency of its formative methods. In most words there is no difficulty in distinguishing root, affix, and termination, and in recognizing the original form and signification of each. For analyzing words, retracing their history, and referring them to their ultimate roots, the utmost facilities are afforded. This character of the language has determined that of the native science of grammar, on which our own grammatical treatment of it is mainly based. The Hindoo grammar is essentially analytical and etymological, dissecting out roots, affixes, themes, and terminations, and laying down the rules which govern their combination into vocables. About 2,000 roots are catalogued by the native authorities, but the greater part are of no account, being either slightly varied forms of others, or mere grammatical artificialities. The Indo-European roots are far more numerous and faithfully pre-

served, in form and signification, by the Sanskrit than by any other member of the family. It is this remarkable conservation of materials and processes which gives prominent importance to the Sanskrit in Indo-European philology, making its introduction the inauguration of a new era in etymologizing, and so in the science of language, which is based on etymology, or the history of individual words.—The whole system of inflection in Sanskrit is most nearly accordant with that of Greek; it is decidedly richer in declension, but vastly poorer in conjugation. In declension, it distinguishes three genders, the masculine and neuter agreeing in theme, and usually in inflection, the feminine having long terminal vowels and fuller endings. The cases are eight: the nominative, with which in most instances the next case, the vocative, agrees in form; two other cases of relation, the dative expressing for, the genitive of; and four cases of position or direction: the accusative, expressing to, direct approach, immediate action; the ablative, expressing from; the locative, in; the instrumental, by the side of, along with, with, by. Each occurs in three numbers, singular, dual, and plural, and the usual terminations are as follows: sing. nom. *s* (neut. *m* or wanting), acc. *m*, inst. *ā*, dat. *ē*, abl. *as* (or *t*), gen. *as* (*asya*), loc. *i*; dual, nom., acc., and voc. *āu* (neut. *ī*), inst., dat., and abl. *bhīdām*, gen. and loc. *os*; pl. nom. *as* (neut. *āni*, *ī*), acc. *as* (masc. *n*), inst. *bhis*, dat. and abl. *bhyas*, loc. *su*. Adjectives are declined like substantives; as comparative and superlative suffixes they add *tara* and or *īyans* and *ishtha*. The numerals closely accord with those in the related languages. (See GERMANIC RACES AND LANGUAGES, vol. vii., p. 740.) The pronouns, excepting the first and second personal, distinguish three genders. They derive themselves from roots of their own, which play also an important part in the development of forms and form-words. Their many irregularities of declension agree nearly with those of the pronouns in the other Indo-European dialects, nor are their roots peculiar. The verb has two voices, an active and a middle or reflexive, which latter, in a part of its forms, serves also as a passive, as in Greek. It distinguishes throughout, like the noun, three numbers, with the usual three persons in each, and the personal terminations are evidently reducible to forms of pronouns, indicating in each case the subject; they are of two classes, corresponding to those of the principal and historical tenses in Greek. In their normal form they are as follows: active: princ. sing. *mī*, *sī*, *tī*; dual, *vas*, *thas*, *tas*; pl. *mas*, *tha*, *anti*; hist. sing. *m*, *s*, *t*; du. *va*, *tam*, *tām*; pl. *ma*, *ta*, *an*;—middle: princ. sing. *ē*, *sē*, *tē*; du. *vahē*, *āthē*, *ātē*; pl. *mahē*, *dhvē*, *antē*; hist. sing. *i*, *thās*, *ta*; du. *vahī*, *āthām*, *ātām*; pl. *mahī*, *dhvam*, *anta*. The present and imperfect tenses exhibit various modifications of the verbal root into a special stem, on which is founded a division of the verbs

into ten conjugational classes; all are analogous with changes which the Greek verbs more irregularly undergo in the same tenses, and with scattered phenomena in the other related languages. The present has an imperative, distinguished by special terminations, and a potential, corresponding to the Greek optative, having for its characteristic the vowel *i*, or the syllable *ya*, inserted between the root and the personal ending. Of a subjunctive, made, as in Greek, by an *a* between root and ending, only fragments remain, in the antiquated dialect of the Vedas. The characteristic of the imperfect is an augment, a prefixed *a*. Of other tenses, we have an augmented aorist, of double formation, as in Greek; a “second aorist,” which is the imperfect of the unmodified root, and a “first aorist,” in several varieties, having *s* as its sign; a perfect, reduplicated, and with peculiar terminations; a periphrastic future, of late growth; a future of compounded origin, the same with the Greek in *σω*; an imperfect of this future, or a conditional, of very rare occurrence; and finally a precativ, or optative of compound formation, belonging to the aorists, also not common. Fragments of imperative, optative, and subjunctive forms, belonging to the aorist, perfect, and future tenses, are found in the oldest literature, but they are obsolete in the classical Sanskrit. The present, perfect, and future tenses, active, passive, and middle, have participles. Of verbal nouns there is an accusative case (the Latin supine in *um*), used as an infinitive; also an instrumental case, forming a gerund, or a kind of indeclinable past participle (as *bhūtvā*, having been), which is of excessively frequent employment. The derivative forms of the verb, formed at pleasure from any root, are the passive, having a special form only in the present and imperfect, the causative, the desiderative, and the intensive or frequentative. The affluence of verbal forms is thus seen to be great, yet the language is far from making full use of them, and the Sanskrit verb is not to be compared for power of expression with the Greek, or even with the Latin; there is a strong tendency, especially in the later styles of writing, to slight the finite forms, and to construct loose and awkward sentences with the participle and gerund. Prepositions, in our sense, are almost absent, the prepositions of the other Indo-European tongues having here still their original value as adverbs, directing the action of the verb, but not directly governing nouns; as prefixes to verbs they are of constant application, and play a great part in the formation of derivatives. Conjunctions and adverbs are in part derived from pronominal roots, in part from nouns.—Syntax is a branch of the grammar of very inferior interest, and is even left out in most of our Sanskrit grammars. Whatever expressiveness and rhetorical charm the language has lie chiefly in its boundless wealth of epithets, and not at all in the construction of its sen-

tences and periods; indeed, a period in Sanskrit is next to an impossibility; the formation and connection of its clauses is of the baldest simplicity. The excessive use of cumbrous compounds is also a very general fault in Sanskrit construction, appearing in all styles of composition, but especially the more artificial; to say, for instance, "water-play-delighted-maiden-bathing-fragrant (river-breezes)" for "made fragrant by the bathing of maidens delighted with sporting in the water," is a virtual abnegation of the privileges of an inflected language, and a partial retrogradation to the stiff inexpressiveness of the Chinese.—The construction of Sanskrit metre is based entirely upon quantity, as in Greek, with total disregard of accent. The most ancient metres are very simple and almost wholly iambic; much of the later versification is remarkable for its extreme complexity, elaborateness, and artificiality.—LITERATURE. The most ancient literature of India, that of the Vedas, as forming a body of works of separate and peculiar interest, has been treated under INDIA, RELIGIONS AND RELIGIOUS LITERATURE OF; and, with the Vedas, the whole mass also of Vedic literature, the oldest religious literature of the country, and also the two long epics or Itihāsas, the *Mahābhārata* and the *Rāmāyana*. The proper Sanskrit literature counts by thousands its works still in existence, while titles and quoted fragments of hosts of others, not known to be preserved in their entirety, are on record. Most of these works are still in manuscript, and the largest collections of manuscripts out of India itself are those of the India office in London, the royal library at Berlin, and the Bodleian at Oxford. The period it covers stretches, if the Vedas be included, from at least 1500 B. C. to our own day. Nearly all of it was composed after the language had ceased to be in the fullest sense a spoken vernacular; hence a tinge of artificiality, growing deeper as more modern times are approached, rests upon it all. With insignificant exceptions, it is all composed in metre, even works of law, of morality, of science; and, in great part, in the so-called *śloka*, a two-line stanza, each line made up of two eight-syllable feet, the movement being rudely iambic. Every department of knowledge and branch of inquiry is represented in it, with the single exception of history; and the want of the historical element is perhaps the most striking general characteristic of the literature. The Hindoo mind, in utter opposition to the Egyptian and Chinese, has ever been little regardless of objective truth, careless of facts, disinclined to observe and record, laying no stress on the events of outward life, heedless of their connection and succession; hence the absence of a chronology in the literary as well as the political history of India, and the uncertainty of centuries resting upon the date of almost every work. Much of this mass of literary productions is of a character which has com-

manded high and general admiration; but it exhibits the characteristic faults and deficiencies of the oriental mind in no light degree. The want of history robs it of one great source of worth and interest; much of it is trivial and tedious; and to place even its masterpieces on a par with those of the classical languages would be highly presumptuous. Its interest as a record of the life of a great and highly endowed people, of our own blood, whose influence and institutions have affected all eastern Asia, is not easily overestimated. Of other epic or quasi-epic poems besides the *Mahābhārata* and the *Rāmāyana*, we may mention the *Raghuvansa* ("Race of Raghu"), *Kumāra-Sambhāva* ("Birth of the War God"), and *Nalodaya* ("Rise of Nala"), all by Kālidāsa; Magha's "Death of Sisupāla;" and Harsha's *Naishadhīya*. In the lighter style of lyric and erotic poetry, which is abundantly represented, and by works of greatly differing merit, are the *Ritusanhāra* ("Seasons") and *Meghadūta* ("Cloud Messenger") of Kālidāsa, and the *Gīta-Govinda* of Jayadeva, describing the adventures of the god Krishna among the shepherdesses, the companions of his youth, a favorite theme of Hindoo song. The "Centuries" of Bhartrihari, and other like works, are aphorismic, pearls of thought and style, intended for edification and instruction. The same ends are served by the collections of fables, of which the most accepted have found their way all over the world; the *Panchatantra*, through Persian and Arabic translations, has entered almost every western literature, as the fables of Bidpai or Pilpay. A somewhat later collection of the same materials, the *Hitopadesa* ("Salutary Instruction"), is one of the most popular books of the Sanskrit literature. The Sanskrit fable is much longer drawn than the western, and depends for its interest more on discourse, and less on situation and action. The Hindoo tales, in verse and in prose, are of comparatively small consequence in the literature; the most noted collection is the *Kathāsaritsāgara* ("Ocean of Streams of Narration"); through the medium of Persian versions, they are regarded as forming the groundwork of the Arabic literature of like class, represented to us chiefly by the "Arabian Nights' Entertainments." The drama is a most interesting branch of Hindoo literature; no other ancient people, excepting the Greek, has brought forth independently anything so admirable in this department. The most celebrated dramas are the *Mrichhakatī* ("Toy Cart") of Sudraka, and the different works of Kālidāsa, as the *Sakuntalā*, the *Urvashī*, and "Malavika and Agnimitra," all of which have been edited and translated. The *Sakuntalā* is one of the most perfect flowers of the Indian genius; and its selection by the enlightened taste of Sir William Jones and his translation of it into English (1789), whence it passed at once into every language of Europe, was an important epoch in the early history

of Sanskrit study. The subjects of the drama are mainly legendary, their catastrophes always happy. They are written in mixed prose and verse, and likewise in mixed Sanskrit and Prakrit; only the higher male characters speaking the cultivated or learned tongue, while the lower, and all the females, talk the vernacular dialect. The machinery of the Hindoo stage is not well understood, but it is believed to have been very simple. The grounds on which Kālidāsa has been usually assigned to the 1st century B. C. are now acknowledged to be entirely futile, and the time of the bloom of dramatic composition is as uncertain as other such matters in Hindoo history; more probably it is at least two or three centuries after Christ, or even, as many scholars believe, as late as the 11th century. (See KALIDASA.) The Purāṇas form a separate class of works, being the religious literature of the middle period, later than the Vedic, preceding the modern and comparatively insignificant tantras and śāstras, all of which have been described in INDIA, RELIGIONS AND RELIGIOUS LITERATURE OF. The law books attach themselves to, and are a development of, a part of the Vedic literature, viz.: treatises prescribing the religious observances and rules of life of the orthodox Hindoo; domestic and civil duties, offences and penalties, purification and penance, are their subjects. The oldest and most famous among them is the code ascribed to the mythical sage Manu; it has been often translated, and is a chief source of authentic knowledge respecting the elaborated system of Brahmanic polity.—In treating of the scientific literature, the grammar, for its antiquity, originality, and profundity, is entitled to the first place. In its inception and method it is entirely peculiar, and it has carried phonetic and etymological analysis further than any but the best modern European science. Here, as more than once in other departments, the early works containing the beginnings of the science are lost; the most ancient extant authority, Pāṇini, is the supreme one; the immense grammatical literature is made up almost solely of commentaries and continuations of his work. Its age is uncertain, but it is usually assigned to the 3d or 4th century B. C. Its form is very peculiar; it carries brevity to the utmost extreme, far beyond the limits of orderly arrangement and intelligibility, availing itself of a technical terminology almost mathematical; the 4,000 concise rules which compose it are often compared to so many algebraic formulas. The same style is characteristic of some other departments of the literature, and especially of the text books of the schools of philosophy. Philosophy is another highly important branch of Indian science, and has its roots in the very earliest literature. There are six chief systems: the *Mīmāṃsa* of Jaimini and *Vedānta* of Bādarāyana, founding themselves more directly on the Vedas, and so especially ortho-

dox; the *Nyāya* of Gautama and *Vaiśeṣika* of Kanāda, wearing an especially logical character; and the *Sāṅkhya* of Kapila and *Yoga* of Patanjali, atheistic and theistic branches of a school named from the precision affected in the enunciation of its principles. The general character of these systems has been described in connection with the religions of India. The Buddhist Sanskrit literature is immense, and has been carried by the spread of the religion to many other countries of Asia, into whose languages it has been translated. The astronomical literature is later by some centuries than the Christian era, and nearly all there is of true science in the astronomy of the Hindoos was learned by them from the Greeks. They have made in arithmetic and algebra remarkable original progress; and the Hindoo system of decimal notation has made its way, through the Arabs, to the exclusive use of modern enlightened nations, our usual figures being by origin letters of the Sanskrit alphabet. The acquirements of the Hindoos as regards the interpretation of the symptoms of disease, and the application of medical and surgical remedies, are not insignificant, and their medical literature, which is as yet little known, is regarded as well deserving study; the most esteemed author whose works are preserved is Susruta. Rhetoric, versification, and music are each represented in a department of the literature. Respecting the arts, whether the fine arts or the practical, little of value is known to exist.—The best Sanskrit grammars are, in English, Williams's (3d ed., Oxford, 1864) and Max Müller's (1870); in French, Oppert's (Berlin, 1859); in German, Bopp's (4th ed., 1868), and, as a manual of reference for the advanced student, Benfey's (Leipsic, 1852). Wilson's lexicon (two editions, Calcutta, 1819 and 1832), an inferior work, but long indispensable to the student, is out of print and very dear; a third edition was begun by Goldstücker, but never finished. Westergaard's *Radices Linguae Sanscritae* is very valuable, and a necessary accompaniment of Wilson. Benfey has published a brief hand dictionary (London, 1866), and Monier Williams a very full and valuable lexicon in a single 4to volume (London, 1872). The great Sanskrit-German lexicon of Böhtlingk and Roth (St. Petersburg), an immense and admirable work, was completed in 1875. Bopp's *Glossarium Sanscritum* (Berlin, 1847) serves the beginner in connection with the texts published by the same author, and contains all the roots and much linguistic information. A good and useful chrestomathy is still a desideratum; of Lassen's (Sanskrit and Latin, Bonn, 1838) a new edition has been issued by Gildemeister (Bonn, 1865); Böhtlingk's (St. Petersburg, 1845) lacks a glossary; Benfey's (Leipsic, 1853-'4) is of small service to an unpractised scholar. Texts to be recommended to the beginner are Bopp's selections from the *Mahābhārata*, especially his *Nalus* (Berlin, 1832), or Williams's *Nala* (Oxford,

1860); the *Hitopadesa* of Schlegel and Lassen (Bonn, 1829), or Johnson (Hertford, new ed., 1864), or Müller (London, 1854-'65); the *Bhagavad-Gitā* of Schlegel and Lassen (Bonn, 1846) or Thomson (Hertford, 1855); the *Sakuntalā* of Böhlingk (Bonn, 1842), or Williams (Hertford, 1853), or Burkhard (Breslau, 1872); Böhlen's *Bhartrihari* (Berlin, 1833); and Johnson's *Meghadūta* (London, 1867).

SANSON, Nicolas, a French geographer, born in Abbeville, Dec. 20, 1600, died in Paris in July, 1667. He produced a map of Gaul at the age of 16, and about 1640 was named geographer to the king. His maps are very numerous, and more correct than those of Ortelius and Mercator, although he adhered to the Ptolemaic longitudes. He published works on the geography of ancient Gaul, Greece, the Roman empire, sacred geography, &c. His three sons were all geographers.

SANT, James. See supplement.

SANTA ANA, a N. W. county of New Mexico, bordering on Arizona, and intersected in the S. E. by the Rio Grande; area, about 7,000 sq. m.; pop. in 1870, 2,599. It is watered in the east by tributaries of the Rio Grande, and in the west by affluents of the San Juan and Colorado Chiquito. The surface is mountainous. The chief productions in 1870 were 2,975 bushels of wheat, 9,521 of Indian corn, and 26,334 lbs. of wool. They were 155 horses, 269 mules and asses, 1,477 cattle, 32,630 sheep, and 112 swine. Capital, Jemez.

SANTA ANNA, Antonio Lopez de, a Mexican general, born in Jalapa, Feb. 21, 1798, died in Mexico, June 20, 1876. He fought in 1821 against the royalists, gained some success, and received the command of Vera Cruz (1822); but insubordination led to his dismissal, and he took revenge by aiding in the downfall of the emperor Iturbide. Becoming chief of the federal party in the succeeding contest, he was signalily defeated, and retired to his home. At the end of 1828 he secured the overthrow of the Pedraza administration, and shortly after the elevation of Guerrero, who made him minister of war and commander-in-chief of the army, after Santa Anna had repelled the Spanish invasion under Barradas, in September, 1829. He subsequently headed two successful insurrections, one to replace Guerrero in the executive functions by Bustamante, and the other to overthrow the latter in favor of Pedraza (January, 1832). In March, 1833, he was elected president; but, though a favorite with the army, he was unpopular with the nation, being suspected of aiming at the imperial crown. Several insurrections broke out, the last and most formidable of which was crushed by Santa Anna on May 11, 1835, when the insurgents sustained severe losses, and the republican party received a fatal blow. A complete administrative reorganization was now effected, and the governors of the several states were henceforth dependent upon the supreme power. A revolutionary feeling long

existing in Texas now broke out into open insurrection. Early in 1836 Santa Anna took the field in person. By the middle of February he reached the Rio Grande at the head of 6,000 troops, stormed the Alamo at San Antonio on March 6, after several days' siege, and massacred its defenders, but with great loss to himself, and after the massacre at Goliad, done under his express orders, marched toward Gonzales. At San Jacinto he was totally routed by the Texan army under Houston, April 21. The next day he was taken prisoner, and his functions were at once suspended by the Mexican government. In 1837 he returned to his native country by way of the United States, but was coldly received, and at the presidential election of that year he had only 2 out of 69 electoral votes, after which he retired to his estates at Jalapa. The same year he took part in the defence of Vera Cruz, bombarded by the French, and there sustained an injury which necessitated the amputation of a leg. In the long contention between the centralists and federalists he was one of the leaders of the former; and from Oct. 10, 1841, to June 4, 1844, he was virtual dictator, under the title of provisional president. He was again constitutional president, under the instrument of June 12, 1843, from June 4 to Sept. 20, 1844, when he was deposed by a new revolution, taken prisoner near Tlaxolula on Jan. 15, 1845, and banished for ten years, and took up his residence in Cuba. In 1846 he was recalled, appointed generalissimo, and in December made provisional president. Immediately after, at the head of 20,000 men, he advanced northward, and on Feb. 22, 1847, attacked the American troops at Buena Vista, 5,000 strong, under Gen. Taylor, by whom he was effectually repulsed on the following day. Having raised a new army, he took up a position at Cerro Gordo, where he was again defeated by the Americans, under Gen. Scott, on April 18. Collecting 3,000 men from the fragments of his army, he retreated toward the city of Mexico. Late in April he was informed of his appointment to the presidency by congress; but finding subsequently that the election for president which the states had held on May 15 was unfavorable to his pretensions, he prevailed on congress to postpone the counting of votes until January, 1848, and in the mean time banished or imprisoned all who opposed his schemes, and established a severe censorship of the press. He had organized an army 30,000 strong for the defence of the capital; but Molino del Rey was stormed by Gen. Scott on Sept. 8, 1847, and Chapultepec on the 13th, and on the 14th the city of Mexico fell. Santa Anna now resigned the presidency, and made a last effort to retrieve his reputation by the siege of Puebla; but he was attacked by Gen. Lane at Huamantla, and forced to retire from the place, which was now relieved. Having received permission from the American commander-in-chief, he sailed for Jamaica on April 5, 1848.

In 1853 he returned to Mexico, and was received with great enthusiasm. He was appointed president for one year, after which time he was to call a constituent congress; but he fomented a new revolution by which he was declared president for life, with power to appoint his successor, and with the title of most serene highness. He began to rule with despotic authority, and the revolution of Ayutla followed, led by Gen. Alvarez. After a struggle of two years, Santa Anna signed his unconditional abdication, and sailed on Aug. 16, 1855, for Havana. He afterward spent two years in Venezuela, and thence went to St. Thomas. During the French invasion he reappeared in Mexico, and pledged himself to strict neutrality; but a manifesto tending to excite disturbance in his favor led Gen. Bazaine to order him to quit the country in May, 1864. Maximilian, however, appointed him grand marshal of the empire; but in 1865, having been implicated in a conspiracy against the emperor, he again withdrew to St. Thomas. In 1867 he made a last attempt to gain ascendancy in Mexico, but was taken prisoner at Vera Cruz and condemned to death. Juarez pardoned him, on condition of his quitting Mexican soil for ever, and he came to the United States. After the death of Juarez he was permitted to return, and he subsequently lived in seclusion in the city of Mexico.

SANTA BARBARA, a S. W. county of California, bounded S. and W. by the Pacific ocean, N. by the Guaymas or Santa Maria river, and drained by Santa Inez and other rivers; area, about 2,800 sq. m.; pop. in 1870, 7,784, of whom 109 were Chinese, since which a portion has been taken to form Ventura county. The eastern portion is mountainous, the western undulating. The soil near the coast is generally fertile, and in the valleys bountiful crops are produced. Formerly stock raising was the principal business; but latterly much attention has been devoted to the culture of grapes, oranges, and almonds. Gold, iron, copper, salt, asphalt, and petroleum are found. The chief productions in 1870 were 20,200 bushels of wheat, 158,374 of Indian corn, 187,871 of barley, 41,934 of peas and beans, 26,539 of potatoes, 996,200 lbs. of wool, 81,088 of butter, 34,500 of cheese, and 8,655 tons of hay. There were 3,777 horses, 2,166 milch cows, 7,993 other cattle, 189,358 sheep, and 3,947 swine.—**SANTA BARBARA**, the capital (pop. about 6,500), in a sheltered nook on the shore of the Pacific, 275 m. S. S. E. of San Francisco, has several hotels, two banks, a college, good public schools, three daily and two weekly newspapers, and seven churches. It is noted as a health resort on account of its mild and equable climate, and is growing rapidly. It occupies the site of a mission founded in 1780.

SANTA CATHARINA, a S. E. province of Brazil, bounded N. W. and N. by Paraná, E. by the Atlantic, and S. and S. W. by São Pedro; area, 28,220 sq. m.; pop. about 140,000. The

island of Santa Catharina, separated from the mainland by a strait varying in width from $\frac{1}{2}$ m. to 7 m., is about 30 m. long from N. to S., and about 10 m. wide. The strait is divided into two good harbors, the northern being one of the best in South America. The island is mostly covered with fine woods and abounds with water; its climate is temperate and salubrious. The coast of the mainland is level, but the interior is traversed by the Serra do Mar. The Uruguay has its source in this province. The climate is temperate. The province is one of the most fertile in Brazil, but not well settled. Beds of good bituminous coal have been discovered. Considerable oil is prepared from whales taken in the strait, and timber and cordage are exported. There are flourishing German colonies in the province. Capital, Desterro.

SANTA CLARA, a W. county of California, bounded N. by San Francisco bay, watered by the Coyote and Guadalupe rivers and other small streams; area, 1,332 sq. m.; pop. in 1870, 26,246, of whom 1,525 were Chinese. It occupies the fertile valley between the Coast and Santa Cruz mountains, extending to the summits of the ranges on either side. The hillsides are heavily wooded with redwood, oak, madrone, spruce, &c. There are mineral and hot springs. The New Almaden and Guadalupe quicksilver mines are in this county. It is traversed by the Southern Pacific railroad, and by the San José branch of the Central Pacific. The chief productions in 1870 were 1,188,187 bushels of wheat, 405,575 of barley, 31,764 of potatoes, 85,150 gallons of wine, 179,465 lbs. of wool, 179,675 of butter, 525,290 of cheese, 94,000 of hops, and 45,779 tons of hay. There were 7,926 horses, 7,553 milch cows, 14,569 other cattle, 49,085 sheep, and 8,135 swine; 3 manufactories of carriages and wagons, 2 of iron, 2 of machinery, 1 of paper, 12 of saddlery and harness, 6 of tin, copper, and sheet-iron ware, 1 of woollens, 2 establishments for smelting quicksilver, 2 planing mills, 6 saw mills, 2 tanneries, 2 currying establishments, and 8 flour mills. Capital, San José.

SANTA CLARA COLLEGE. See SAN JOSÉ.

SANTA CRUZ, a W. county of California, lying between the summit of the Santa Cruz mountains and the Pacific ocean, and bounded S. by the Pajaro river; area, 432 sq. m.; pop. in 1870, 8,743, of whom 156 were Chinese. There is considerable fertile land, but the greater portion consists of mountain ranges densely timbered with redwood, oak, and pine, and adapted to grazing. There is abundant water power. Copper, coal, gold, and sand for glass making are found. The chief productions in 1870 were 115,687 bushels of wheat, 22,795 of Indian corn, 56,690 of oats, 72,155 of barley, 34,253 of potatoes, 14,550 gallons of wine, 120,955 lbs. of butter, 120,225 of cheese, and 8,664 tons of hay. There were 1,729 horses, 2,168 milch cows, 2,745 other cattle, 819 sheep, and 3,408 swine; 1 manufactory of gunpowder, 4 of

lime, 2 of cooperage, 1 of engines and boilers, 5 of saddlery and harness, 3 of tin, copper, and sheet-iron ware, 5 tanneries, 4 currying establishments, 1 flour mill, 2 planing mills, and 22 saw mills. Capital, Santa Cruz.

SANTA CRUZ, or *Saint Croix*, an island of the West Indies, 65 m. E. S. E. of Porto Rico, the largest and southernmost of the Virgin group, forming with St. Thomas and St. John the Danish government of the West Indies; length about 25 m., greatest breadth 5 m.; area, 84 sq. m.; pop. in 1870, 22,760. The surface is level, with a range of low hills in the north. There are numerous streams, and the soil is fertile. Nearly the whole island is cultivated, about half being planted with sugar cane. Santa Cruz was discovered by Columbus on his second voyage, and has been in the hands of the Dutch, British, Spanish, and French, the last of whom ceded it to Denmark in 1733. The British took it in 1807, but restored it to the Danes by the treaty of Paris. English is the language generally spoken. Capital, Christiansted.

SANTA CRUZ, a fortified town, capital of the Canary islands, on the N. E. coast of the island of Teneriffe; pop. about 11,000. The harbor is good, and has a fine long mole. In 1871, 150 vessels entered, with an aggregate of 94,067 tons. The exports include cochineal, wine, almonds, raw silk, barilla, and archil.

SANTA FÉ, a S. E. province of the Argentine Republic, bordering on the Gran Chaco and the provinces of Corrientes and Entre-Ríos (from which it is separated by the Paraná), Buenos Ayres, Cordova, and Santiago; area, 20,000 sq. m.; pop. in 1869, 75,178. It is flat in the south and centre, and hilly in the north. Besides the Paraná, the principal rivers are the Tercero and the Salado; there are many small streams. There are numerous lakes, some of which are salt, and extensive forests. Wheat, maize, and tobacco are cultivated, and, with wax, honey, oranges, and other fruits, and skins, are exported in large quantities. The colonies established in this province are the most numerous and prosperous in the republic. The chief industries are agriculture and cattle rearing. (See ARGENTINE REPUBLIC.) Of 20,002 children between the ages of 6 and 14 in 1869, 4,303 attended school. The province is divided into the departments of Santa Fé, San José, San Gerónimo, and Rosario. The capital is Santa Fé, a prosperous town with 10,670 inhabitants in 1869; and the chief town is Rosario, the second city in the republic.

SANTA FÉ, a N. central county of New Mexico, drained by the Rio Grande and small tributaries of that river, and by the head waters of the Rio Pecos; area, about 1,800 sq. m.; pop. in 1870, 9,699. The surface is mountainous, and the soil, except in the valleys, poor and sandy. There are gold mines. The chief productions in 1870 were 6,314 bushels of wheat, 20,262 of Indian corn, 1,389 of peas and beans, 28,918 lbs. of wool, and 490 tons

of hay. There were (on farms) 416 horses, 840 mules and asses, 2,116 milch cows, 1,388 working oxen, 630 other cattle, 23,843 sheep, and 656 swine; 2 manufactories of jewelry, 2 breweries, 1 saw mill, and 2 quartz mills. Capital, Santa Fé.

SANTA FÉ, the capital of New Mexico and of Santa Fé co., situated on both banks of Santa Fé creek, which flows W. 14 m. into the Rio Grande, at an elevation of 6,862 ft. above the sea, about 275 m. S. by W. of Denver, Colorado, and nearly 900 m. W. by S. of St. Louis, Mo.; lat. 35° 41' N., lon. 106° 10' W.; pop. in 1870, 4,765; in 1875, about 6,000, of whom about 5,000 are of Spanish and Mexican origin and speak the Spanish language. Stage coaches run daily to Pueblo, Col., about 190 m. N. N. E., the terminus of the Denver and Rio Grande railroad, and to Las Animas, Col., about 230 m. N. E., the terminus of a branch of the Kansas Pacific railroad and of the Atchison, Topeka, and Santa Fé railroad. There is telegraphic communication with Denver. Santa Fé is the centre of supplies for the surrounding country, and is constantly filled with freight wagons and carrying animals, the latter being the *burros* or donkeys commonly used in the territory. The valley in which it is situated is irrigated from Santa Fé creek and is surrounded by high mountains. The climate is very agreeable, the temperature never reaching either extreme, while the atmosphere is rare and pure. The town is irregularly laid out, and the unpaved streets are very narrow, crooked, and ancient-looking. The public square or plaza, containing about 2½ acres, is bordered on three sides by the principal business houses and on the fourth by the old "palace," one story high, containing the governor's mansion, legislative hall, and court room. In the centre is a beautiful park of trees, chiefly cottonwoods, and here a soldiers' monument of native marble has been erected by the territorial legislature. The buildings are almost without exception of adobe and one story high. In the N. portion are the ruins of two unfinished stone buildings, the territorial capitol and penitentiary, congress having failed since 1855 to appropriate funds for their completion. Near these are the masonic and odd fellows' cemetery and the military and private cemeteries. Within the town is the military reservation of Fort Marcy. Santa Fé was incorporated as a city in 1852, but the succeeding legislature in 1853 repealed the charter. It has, however, municipal regulations and a police, under the prefect of the county. It contains two national banks, each having a capital of \$150,000. The Roman Catholics have a college for boys and a conventual academy for girls, each attended by about 150 pupils. One newspaper, the daily and weekly "New Mexican," is published in English and Spanish. There are four Roman Catholic churches and a Presbyterian mission church. The Episcopalians also have a resi-

dent missionary, but no church edifice. A new Roman Catholic cathedral is in course of construction around the old one, which is still used.—Santa Fé is known in the old church records and is often mentioned in the archives of the former governments of the country as

Marta, 455 m. N. of Bogotá; pop. about 4,000. It is situated in the midst of sand marshes, near the mouth of the Manzanares. The houses are chiefly of one story, roofed with straw or tiles, and there is a fine cathedral. The port, which is spacious and commodious,

and defended by three forts, is well frequented by shipping, chiefly engaged in coasting and the West Indian trade. Steamers ply monthly between Santa Marta and New York. The principal exports are Peruvian bark, hides, skins, coffee, hats, fustic and other dyes, and medicinal plants. The value of the exports to New York in 1872 was \$290,182.

SANTA MAURA (modern Gr. *Leccada*; anc. *Leucadia* or *Leucas*), an island and eparchy of Greece, one of the Ionian islands, in the Ionian sea, separated by a strait 1 m. wide from the W. coast of Acarnania; area, 111 sq. m.; pop. in 1870, 20,892. It is 22 m. long by from 5 to 9 m. wide, and is traversed N. and S. by a limestone ridge, terminating S. W. in Cape Ducato (the ancient Leucas, famous for Sappho's leap), and culminating



Street Scene in Santa Fé.

the city of "Santa Fé de San Francisco de Asis," St. Francis being the patron saint. St. Francis's day (Oct. 4) is still celebrated with much ceremony. When first visited by the Spaniards, about 1542, the town was a populous Indian pueblo. It is not known when it was first settled by the Spaniards, but it has been the capital of New Mexico since 1640. It was captured in 1680 and the principal buildings were burned by the Indians, who drove the whites from the country. It was recaptured by a Spanish force in 1694, when the inhabitants returned. The most formidable subsequent attack by the Indians was in 1837, when they were defeated by Manuel Armijo. It was occupied by the United States troops on Aug. 18, 1846. It was entered by the confederate forces from Texas on March 10, 1862, who were forced to evacuate it on April 8.

SANTA FÉ DE BOGOTÁ. See Bogotá.

SANTA MARIA (Sp. *Puerto de Santa María*), a city of Andalusia, Spain, in the province and 6 m. E. N. E. of the city of Cadiz, on the right bank of the Guadalete, where it falls into the bay of Cadiz; pop. about 21,000. It is second to Cadiz in exporting wine of excellent quality, and to Jerez in the extent of its wine cellars. Brandy, liqueurs, oil, hats, soap, leather, and wax are manufactured.

SANTA MARTA, a city of the United States of Colombia, capital of the state of Magdalena, on the E. shore of the bay of Santa

near the centre of the island in Mount St. Elias, about 3,750 ft. high. The whole surface is more or less broken; only a small portion is cultivated, and the crop of grain is insufficient for home consumption. The principal exports are oil, wine, and salt, the last procured by evaporation in the lagoon. Capital, Amaxichi, also sometimes called Santa Maura.—The ancient Leucas (Gr. *λεῦκος*, white) derived its name from the limestone cliffs. In the time of Homer it was united to the mainland at the N. E. extremity by an isthmus, which was cut through by the Corinthians about the middle of the 7th century B. C. The town of Leucas, which was founded near the isthmus by the Corinthians, became the headquarters of the Acarnanian league, and was taken and plundered by the Romans in 197 B. C. On the promontory of Leucas was a temple to Apollo, and at the annual festival of the god it was customary to cast a criminal from the rock into the sea. Birds of all kinds were tied to him to break his fall, and if he survived boats were ready to save him; but in that case he was banished for ever. This expiatory rite gave rise to the story that lovers leaped from this cliff to escape the pangs of love.

SANTANDER. 1. A province of Spain, in Old Castile, bordering on the bay of Biscay and the provinces of Biscay, Burgos, Palencia, Leon, and Asturias; area, 2,112 sq. m.; pop. in 1870, 241,581. The Cantabrian mountains, on its S. limit, abound in forests and valuable

timber, and are intersected by fertile valleys. It has productive fisheries, iron, lead, and copper mines, and limestone, marble, gypsum, and potter's clay. The trade is greatly hindered by the want of good roads. **II.** A city (anc. *Portus Blendium*), capital of the province, on the bay of Biscay, 215 m. N. of Madrid; pop. about 35,000. The houses are narrow and poor in the old quarter, but handsomely built in the new. It is the seat of a bishop, and has a commercial school, a school of navigation, an excellent institute for higher studies, and other literary and scientific institutions. There are a Gothic cathedral and an old convent, now an immense tobacco manufactory, tanneries, and sugar refineries. The harbor is of easy access, and has a lighthouse and excellent anchorage. There are regular steamship lines to Bayonne, Bilbao, Havana, Liverpool, London, and Hamburg.—The city was sacked by Soult in 1808, was stormed by the Spaniards but retaken by the French in 1809, and evacuated by them in 1812.

SANTAREM, a town of Portugal, in the province of Estremadura, on the right bank of the Tagus, 45 m. N. N. E. of Lisbon; pop. about 8,000. It occupies the summit and two sides of a hill, and the houses are mostly in decay. It has two colleges and a seminary, and a large trade in grain, olive oil, and wine. Santarem was taken from the Moors by Alfonso I. in 1146; and it was the last stronghold of the Miguelites in 1833-'4.

SANTA ROSA, a W. county of Florida, bordering on Alabama, watered by the Yellow and Blackwater rivers, and washed on the S. W. by Pensacola bay and Escambia river; area, 1,440 sq. m.; pop. in 1870, 3,312, of whom 562 were colored. The surface is flat and the soil poor. Santa Rosa island is off the S. shore. The chief productions in 1870 were 6,872 bushels of Indian corn, 1,887 of sweet potatoes, 27,845 lbs. of rice, and 1,328 gallons of molasses. There were 1,976 cattle and 1,291 swine. Capital, Milton.

SANTEE, a river of South Carolina, formed by the Congaree and Wateree, which unite near the middle of the state, at the junction of Sumter, Richland, Orangeburg, and Clarendon counties, whence it flows S. E. into the Atlantic by two mouths in lat. 33° 6' N. The main stream is about 150 m. long, and steamboats ascend to Columbia on the Congaree, and Camden on the Wateree. Its lower part is skirted by rice swamps and pitch pine forests.

SANTERRE, Antoine Joseph, a French revolutionist, born in Paris, March 16, 1752, died there, Feb. 6, 1809. He inherited from his father a large brewery in the faubourg St. Antoine. In 1789 he was an elector and a commander in the national guard, and took part in the attack on the Bastille, and subsequently in the disturbances on the Champ de Mars (1791), after which he fled to escape arrest. The amnesty granted after the king's adoption of the constitution enabled him to renew his

agitation, and he led the populace to the Tuileries on June 20, 1792, played a conspicuous part in the insurrection of Aug. 10, and became chief commander of the national guard of Paris, with the rank of general of division. In this capacity he escorted Louis XVI. to the Temple and to the guillotine, and ordered the drums to beat to drown the king's voice, which gave him an unfounded reputation for cruelty. Subsequently he commanded a division in Vendée, where he showed great incapacity, and was signally routed at Coron, near Chollet, Sept. 18, 1793. Returning to Paris in disgrace, he was imprisoned as an Orleanist, but released after the fall of Robespierre. Owing to his influence with the mob, he was confirmed in his rank by Napoleon, but was not actively employed. He ended his life in comparative poverty.—See *Santerre, sa vie publique et privée*, by Carro (Paris, 1847).

SANTIAGO. **I.** A central province of Chili, bordering on the Pacific and the Argentine Republic, and the provinces of Aconcagua, Colchagua, and Valparaíso; area, 7,800 sq. m.; pop. in 1872, 380,419. It is extremely mountainous, the Andes here including some of the most elevated peaks in America. The chief river is the Mapu. Silver and copper abound, and many mines are in operation. There are many mineral springs. In the lower regions the climate is mild and the soil extremely fertile, and agriculture is here in a higher state of perfection than elsewhere in South America. Cattle rearing is an important industry, and jerked beef is exported. The culture of tobacco, for which the soil is well adapted, is prohibited, its importation being a government monopoly. The province is divided into the departments of Santiago, Melipilla, Rancagua, and Victoria; the chief towns, besides the capital, are Rancagua and Melipilla. **II.** A city, capital of the province and of Chili, on the Rio Mapocho, about 70 m. S. E. of Valparaíso; lat. 33° 27' S., lon. 70° 40' W.; pop. given in 1865 at 115,377, but by Asta-Burruaga, in his *Diccionario de Chile* (1867), at 150,000. It lies between two cordilleras, about 1,800 ft. above the sea, 8 m. W. of the foot of the Andes. The streets are spacious and regular, well paved, and lighted with gas. The houses are of brick, with ornamented courtyards. The public squares and several of the avenues are profusely embellished with fountains and statues. The river is crossed by handsome bridges. The cathedral, founded in 1750, on the W. side of the Plaza Mayor, is 351 ft. long by 92 ft. wide, with a superb frontispiece. On the same square are the post office and treasury (formerly the *casa de la audiencia*), the city hall, criminal courts, the former residence of the presidents, now converted into a barrack, and the archiepiscopal palace, in the Moorish style. The mint is a beautiful edifice 460 ft. long by 350 ft. wide, a portion of which serves as the president's palace and for the offices of the ministry. The congress building was erected

in 1858, contiguous to the old church of the Jesuits, destroyed by fire Dec. 8, 1863, when 1,600 persons, chiefly women, perished in the flames. The hill of Santa Lucia rises in the centre of the city to a height of 254 ft., and on its N. and S. flanks stand two fortresses. The theatre ranks among the finest in America. The city has a powder magazine, a vast artillery barrack, a penitentiary, a house of correction for children, a military and two fine general hospitals, an insane asylum, a house of refuge, and many other benevolent institutions. The educational establishments include the academy of science, the university or national institute with 1,200 students, a military academy, schools of design, a school of agriculture with a model farm, two normal schools, the *seminario conciliar*, and about 40 primary and grammar schools, public and private, the former being gratuitous. The national library contains 40,000 volumes and many rare manuscripts. The mean temperature is 68° F. in summer and 49° in winter, when rains are frequent and heavy. Santiago is the commercial centre for the province. There are tanneries, flour mills, silver refineries, three banks, and a fire insurance and a life insurance company. The city is connected by telegraph with the principal ports of the republic, and by rail with Valparaiso and Talca; and a transandine railway to Buenos Ayres was projected in 1874. —Santiago was founded in 1541 by Pedro de Valdivia, under the name of Santiago del Nuevo Extremo, and erected into a bishopric in 1561. It was visited by disastrous earthquakes in 1570, 1647, 1657, 1688, 1730, 1751, and 1822, and has frequently suffered from inundations. An international exhibition was opened here on Sept. 16, 1875.

SANTIAGO, or **Santiago del Estero**, a central province of the Argentine Republic, bordering on Santa Fé, Cordova, Catamarca, Tucuman, Salta, and the Gran Chaco; area, 35,000 sq. m.; pop. in 1869, 132,763. The face of the country, somewhat mountainous in the west, consists mainly of an undulating plain, sloping toward the southeast. The province is watered by the Dulce, Salado, and many smaller streams, which are dried up during the summer. There are many lagoons and lakes, mostly salt, the chief of which is the Laguna de los Porongos on the southern border, fed by the waters of the Dulce. The climate is hot, but not insalubrious; and the soil is fertile, much of the land being devoted to pasturage. The chief productions are wheat, maize, the sugar cane, and fruits. There are large forests. The most important manufactures are those of ponchos and other articles of wool, with laces, some of which are not inferior to the finest imported from Europe. Carbonate and nitrate of soda and carbonate of potash from the salines are exported. Of 33,375 children from 6 to 14 years of age in 1869, 3,684 attended school. The province is divided into 18 departments. The capital is the city of the same name, with

7,775 inhabitants in 1869, founded about the middle of the 16th century.

SANTIAGO DE COMPOSTELA (Lat. *Campus Stellæ*), a city of Galicia, Spain, in the province and 32 m. S. by W. of the city of Corunna; pop. about 29,000. It is surrounded by hills, and has broad paved streets and well built houses. It is the seat of an archbishop. In the cathedral, founded in 1082, the body of St. James the Elder is popularly believed to be buried, and formerly there were frequent pilgrimages to the shrine. The city has a university with about 1,000 students, a public library, a hospital, and a mint. It was sacked in 997 by the Moors, from whom Ferdinand III. took it in 1235, and in 1809–14 it was held by the French.

SANTIAGO DE CUBA (locally called *CUBA*), a city of Cuba, capital of the Eastern department, and of a province of its own name, at the head of a fine bayou on the S. E. coast, 160 m. S. E. of Puerto Principe; lat. 19° 53' N., lon. 75° 53' W.; pop. about 45,000, of whom not more than 10,000 are whites. It is on the side of a hill 160 ft. above the bay. The streets are bad and many of them very steep, but all lighted with gas and lined with stone houses. The cathedral, completed in 1819, is the largest on the island, and there are several other churches, a theatre, a custom house, barracks, and three hospitals. The city is supplied with bad water through an aqueduct, and as it is shut in from the northern breezes, the suffocating heat and the miasmatic effluvia from adjacent marshes render it the most unhealthful abode in the Antilles. The harbor, although one of the best in America, is difficult of access, owing to the narrowness of the entrance. It is defended by four forts. W. of the city, 12 m. distant, are the extensive copper mines of El Cobre, which export annually more than 25,000 tons. The other exports are coffee, sugar, and molasses.—Santiago, founded by Diego Velasquez in 1514, is after Baracoa the oldest town in Cuba. In 1522 it was incorporated as a city, and for a time was the capital of the island. In 1553 it was seized by the French, who surrendered it for a ransom of \$80,000; and in the same century it suffered much from pirates. In November, 1873, the captain (Fry) and several of the crew and passengers of the ship *Virginus* were shot by order of the Cuban authorities at Santiago. This vessel, sailing under the United States flag, had been captured by the Spanish steamer *Tornado* off Jamaica, on the ground that it intended to land men and arms in Cuba for the insurgents. The affair created great excitement in the United States, but was settled by the payment of indemnities by Spain.

SANTIAGO DE LOS CABALLEROS, a city of Santo Domingo, capital of a province of the same name, on the right bank of the Yaqui river, in a savanna nearly surrounded by mountains, 20 m. S. of Puerto Plata; pop. about 8,000. It is built around a large plaza, in which is held the

market; the houses in the main part of the town are mostly of stone. Its climate is healthful, and its district very productive, both in minerals and plants. The tobacco of the Vega Real is sent thither for transportation to Puerto Plata.—Santiago was founded in 1504, in the region called Cibao. It suffered many reverses from the French and buccaneers, and was destroyed by Dessalines, and again by the Spaniards on evacuating the island in 1865.

SANTILLANA, Marquis de. See MENDOZA.

SANTLEY, Charles. See supplement.

SANTO DOMINGO (sometimes improperly called San Domingo), a republic comprising the eastern and larger portion of the island of Hayti, in the West Indies, otherwise called the Dominican republic. (For its physical characteristics, see HAYTI.) It includes all the territory E. of the boundary line fixed by treaty between Spain and France in 1777, which extends from the mouth of the river Pedernales on the S. coast to that of the river Massacre, which flows into the bay of Manzanillo on the N. coast. Its greatest length, from Cape Engaño to the Haytian frontier, is about 260 m., and its greatest breadth, from Cape Isabella to Cape Beata, 165 m.; area estimated at 18,000 sq. m. The republic is divided into five provinces: Santo Domingo, Azua de Compostela, Concepcion de la Vega, Santiago de los Caballeros, and Santa Cruz del Seybo, the capitals of which have the same names respectively. The principal harbors are Santo Domingo, Puerto Plata, and the bay of Samana. The last, which is formed by the peninsula of Samana on the N. E. end of the island, is about 35 m. long and 10 m. wide. Its entrance is made difficult by extensive banks and a reef. Samana bay proper, or the port of Santa Barbara, on the N. side of the large bay, is formed by a line of reefs and islets parallel with the shore. It is $\frac{1}{2}$ m. wide, and, though difficult of access, is deep enough for large vessels.—The soil of Santo Domingo is of extraordinary fertility. Tobacco, sugar cane, cotton, maize, coffee, cacao, and the plantain are the staple productions. The coffee is left in many places to grow wild; and the tobacco, from want of cultivation, is inferior, though with proper care it might equal that of Cuba. The cotton is of fine staple and good length, and might be made as good as any in the world. The forests contain great varieties of valuable trees, among which are mahogany, lignum vitæ, ebony, fustic, a species of logwood, and many other cabinet and dye woods. The plains furnish fine pasturage for the cattle of hundreds of owners, who annually collect and count the animals, and brand the young. The horses are in general small, but graceful and well adapted to the indifferent roads. Mules are numerous, as are also the other domestic animals; and swine raising forms an important industry. In the forests are large numbers of coati-mundis and agoutis. The rivers are infested with alligators. Various spe-

cies of lizards are found, and the iguana, whose flesh is by some regarded as a delicacy, attains a large size. Among the venomous insects are the scorpion, centipede, and tarantula, the stings of which, although causing much pain and inconvenience, are by no means fatal, as is commonly supposed. Gold, silver, iron, and copper are the chief minerals; the first two are said to be extremely abundant in all parts of the republic. The gold mines of La Vega and Buenaventura alone furnished Ovando with the half million of dollars which he sent home annually to the king of Spain, besides what he expended on improvements in the colony. As many as 240,000 crowns of gold were coined in the mint of La Vega in 1502, when the mines were not worked so thoroughly as in later times, and the city of Santiago de los Caballeros was chiefly inhabited by goldsmiths. No mines are now in operation, but considerable grain gold is still extracted. Silver was also mined in large quantities in the 16th century; but the mines were closed by a royal decree from Spain, and they have not been reopened, nor is their precise situation generally known. Mines of tin, lead, quicksilver, sulphur, and rock salt are also mentioned by the Spanish writers; and considerable salt is still produced.—The climate is much more salubrious than that of any of the other West India islands; and the average health and longevity is said to be equal to that of the United States. In the highlands the temperature is equable and agreeable; in the lowlands the thermometer ranges from 84° to 91° F. The intensity of the heat is tempered by the sea breeze, which blows nearly all day long, and by the land breeze, which begins two or three hours after sunset and continues until sunrise. From May to October heavy rains fall, frequently accompanied by thunder and lightning. From February to April it is uniformly dry. Yellow fever and cholera have made considerable ravages on several occasions in the island, but have never been epidemic there.—The population, which is set down by some authorities at 200,000, is said by the United States commissioners, who visited the republic in 1871, not to exceed 150,000. About nine tenths are native Dominicans, springing for the most part from the union of Spaniards, Indians, and negroes, though some are of pure African blood. The whites, about one tenth of the whole, are Spaniards of unmixed race, mainly descendants of the early settlers, and other Europeans, who reside mostly in the seaports and larger towns, and have almost exclusively under their control the foreign commerce of the country. The Dominicans are sober, courteous, affable, and hospitable, and in their intercourse with each other make little distinction of class, race, or color. Very little absolute poverty exists, and mendicancy is almost unknown. Cock fighting is the chief amusement, and gaming is largely practised both in public and in private. High

crimes are rare, and one may safely travel with money and valuables, alone and unarmed, in any part of the country. Few genuine representatives of the indigenous race of the island are now to be found. As they decreased with great rapidity, the colonists brought slaves from Africa. By 1522 so many Africans had been introduced that they rose in insurrection on account of cruel treatment. A colony of blacks emigrated from the United States to Santo Domingo in 1824, and their descendants are still to be traced among the population.—The prevailing religion is the Roman Catholic, but all other sects are tolerated; and there are some Methodist and Baptist churches, supported mainly by the colored emigrants from the United States. The archbishop of Santo Domingo still preserves the title of primate of the Indies, bestowed on him in the Spanish colonial days. There is a so-called university in the capital, and there are several schools there and in the other towns; but public education is little attended to, even in its primary branches.—The commerce of Santo Domingo is small, owing partly to anarchy and partly to customs duties so excessive as to be almost prohibitory. In 1863 the total imports amounted to about \$1,500,000; exports, \$2,500,000. In 1870 the imports were estimated at \$560,000; exports, \$700,000. In 1873 the imports at the chief port, Puerto Plata, amounted to \$871,116; exports, \$1,093,753. The number of vessels that entered that port in the same year was 201, of 12,191 tons. The principal exports are tobacco, coffee, cotton, sugar, cacao, ginger, hides, wax, mahogany, and dye woods. Inland commerce is cramped by the want of good roads, all highways being neglected, and transportation being confined almost entirely to the backs of horses and mules. Steamers run regularly from Puerto Plata and Santo Domingo city to the other West India islands and to New York.—The government is a republic, founded on a constitution adopted in 1844, and proclaimed anew on the departure of the Spaniards in 1865. The president and vice president are elected for six years, with a difference of three years in the time of their election. The president appoints a council of state consisting of four ministers, on one of whom, at his will, devolve the duties of minister of foreign relations. The legislative branch consists of a senate (*senado consultor*) elected for six years, and composed of nine members, two each for the cities of Santo Domingo and Santiago, and one for each of the five provinces. Each province and district has a government, and each parish and military post a commandant nominated by the executive. The towns are governed by councils elected for three years. The judiciary consists of a supreme court which sits in the capital, and a court of first instance in each province and district, sitting in the respective capitals. Each town and parish has also an alcalde or justice of the peace. The revenue is derived

from customs duties, which average 40 per cent., direct and indirect taxation, and sales of public property. There are no recent official returns of the receipts and disbursements of the government; but the United States commission reported the total income for 1870 to be \$772,684 75, of which \$728,605 58 was derived from customs, \$35,466 55 from direct and indirect taxes, and the remainder from sales, rents, &c. The total debt of the republic in 1870 was reported by the commission to amount to \$1,565,831, wholly internal. Besides this, a foreign debt of £757,700 was contracted in London in 1869, which at the close of 1872 had been reduced by a sinking fund to £722,700. The army consists of 4,000 men in time of peace, and on a war footing of 15,000 men. The navy comprises three corvettes and five schooners, with 44 guns.—For the history of Santo Domingo previous to 1844, see HAYTI. On Feb. 27 of that year the inhabitants of the Spanish part of the island declared their independence, and proclaimed the Dominican republic, under the lead of Pedro Santana. The Haytians invaded their territory with 20,000 (according to some authorities, 15,000) men, but were defeated by Santana on March 19. In November a constitution was formed, and Santana was elected president. He resigned in 1848, and was succeeded by Jimenes, who conspired with Soulouque, president of Hayti, and induced the latter to invade Dominica; but Santana, called to command the troops, defeated 5,000 Haytians with but 400 men at Ocoa, April 22, 1849. Santana received the title of liberator of his country, and, having deposed Jimenes, ruled as dictator until the election to the presidency of Buenaventura Baez in the autumn of 1849. Baez secured the recognition of the republic by Great Britain, France, and Denmark. About 1850 the question of annexation to the United States was mooted, but Baez did not favor it, on account of the existence of slavery there. This together with his alliance with the clerical party made him unpopular, and in 1853 Santana was elected president. He banished Baez, and compelled the archbishop to take the oath of allegiance to him as a power greater than the church; but he in turn became unpopular, and Baez was recalled in 1856. In the following year a rebellion broke out, and in 1858 Baez was driven from the island, Santana and liberalism again coming into power. In 1861 Santana, disheartened with affairs and despairing of his ability to preserve peace, suddenly invited Spain to resume her authority over the republic. Geffrard, president of Hayti, protested against the cession to Spain, and gave refuge to many prominent Dominicans who were opposed to it. The Spaniards sent troops into the island, but discontent prevailed everywhere, particularly among the negroes, who feared a return to slavery. In 1863 a serious rebellion broke out, and after two years of fighting, in which every atrocity

was perpetrated, Spain was at last forced to retire, and by an act of cortes, March 3, 1865, declared the independence of Santo Domingo. Large numbers of troops were sent to the island, a great proportion of whom perished in the struggle. Anarchy prevailed on the withdrawal of the Spaniards. Toward the close of 1865 Baez was recalled to the presidency, but in 1866 a conspiracy secured his overthrow, and a triumvirate consisting of Pimentel, Garcia, and Luperon came into power. These were succeeded by José Maria Cabral as president, who attempted to lease Samana bay to the United States, but the offer was declined. In 1868 Baez again became president. In 1871 three commissioners were sent by President Grant to examine into the condition of the Dominican republic, whose inhabitants had voted almost unanimously for annexation to the United States; their report was favorable to annexation, but congress took no action upon it. On Jan. 10, 1873, the bay and peninsula of Samana were ceded to a company formed in the United States; but on March 25, 1874, all the rights of the company were confiscated for non-payment of the stipulated annual rent. Baez was succeeded as president by Ignacio Gonzales, elected Dec. 20, 1873.

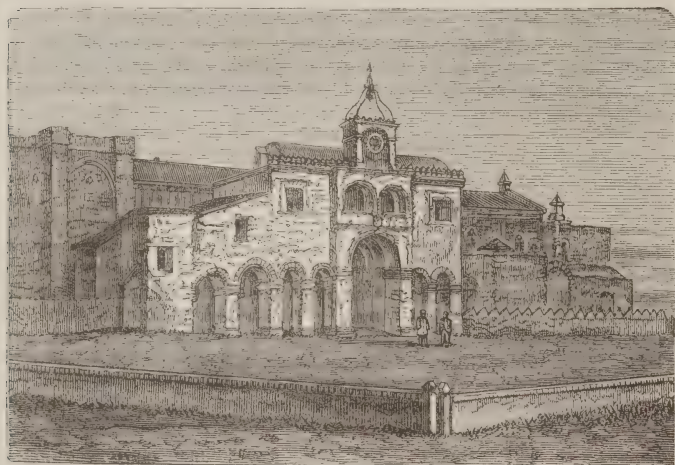
SANTO DOMINGO, a city, capital of a province of the same name and of the republic of Santo Domingo, on the right bank of the mouth of the river Ozama, lat. $18^{\circ} 28' N.$, lon. $69^{\circ} 55' W.$; pop. said to be 10,000, but estimated by the United States commission in 1871 at about 6,000. The town is built on a solid limestone formation, with a perceptible incline toward the river, and is surrounded by a wall, 8 ft.

other. Many of the ancient houses and buildings are still standing, but are only remarkable for their solidity. Few of the many churches which once graced the city now remain. The most noteworthy is the cathedral, in which the remains of Columbus and of his brother Bartholomew reposed for two and a half centuries. It was begun in 1512 and finished in 1540, and was modelled after a church in Rome. On the bank of the river are the ruins of the so-called castle of Columbus, a fortified stone house built by Diego Columbus. There are in the city a seminary, a college, and a primary school, all under the care of the church, with about 300 pupils. In the college are a school of medicine and a night school for gratuitous instruction. The climate is healthful. The trade is principally in cabinet and dye woods, which are brought down from the interior. The port is deep enough for large vessels, the river being 24 ft. deep for three miles, but there is only 18 ft. of water at the entrance.—Santo Domingo city, the oldest existing settlement by white men in the new world, was founded by Bartholomew Columbus in 1494 on the left bank of the Ozama, and was originally called Nueva Isabella. In 1502 it was destroyed by a hurricane, when its location was changed to the opposite side of the river. The walls were built in 1506. In 1586 Sir Francis Drake captured the city, but ransomed it for 25,000 ducats. In 1655 the English under Admiral Penn and Gen. Venables were defeated here.

SANTORIN. See THERA.

SANTORINI, Giovanni Domenico, an Italian anatomist, born in Venice about 1680, died there,

May 7, 1736. He studied medicine at Pisa, and practised in Venice, where he was professor and professor of anatomy. He discovered and described two small cartilages, attached to the apices of the arytenoid cartilages of the larynx, now known as the cartilages of Santorini. His works are: *Opuscula Medica de Structura et Motu Fibrae; De Nutritione Animalis; De Hemorrhoidibus; De Catamenis*, &c. (Venice, 1705); *Observationes Anatomicae* (1724); *Istoria d'un feto estratto delle parti de-*



Cathedral of Santo Domingo.

thick and 10 ft. high, built of *mamposteria*, a composition of earth, powdered stone, and lime; it is 4,500 yards in circumference, and is strengthened with bastions. The streets are straight, wide, and at right angles to each

retane (1727); *Istruzione alle febbre* (1784); and *Anatomica Septemdecim Tabulae*, &c. (Parma, 1775).

SÃO FRANCISCO, a river of Brazil. See BRAZIL, vol. iii., p. 220.

SAÔNE (anc. *Arar*; in the middle ages, *Se-gona* or *Saucona*), a river of France, which has its source at Vioménil, in the S. W. part of the department of Vosges, flows generally S. through the departments of Haute-Saône, Côte d'Or, and Saône-et-Loire, forms the boundary between those of Rhône and Ain, and unites with the Rhône at Lyons. Its length is 280 m., of which 190 m. are navigable for steamboats. The town of Gray is the head of navigation at the ordinary height of the river, but during an overflow large rafts, loaded with staves, iron, and other heavy produce, descend from the department of Vosges to Gray. Its principal affluents are the Oignon, Doubs, and Seille from the left, and the Ouche and Grône from the right. The Burgundian, Central, and Rhône and Rhine canals connect it with the Rhine and the Seine. Though usually a gentle stream, it has at times been subject to destructive floods; several of these are on record, including one in 1840 which produced great loss of property and life at Lyons.

SAÔNE-ET-LOIRE, a S. E. department of France, in Burgundy, bordering on Côte-d'Or, Jura, Ain, Rhône, Loire, Allier, and Nièvre; area, 3,302 sq. m.; pop. in 1872, 598,344. It is crossed from N. to S. by a mountain range, and is watered W. of this ridge by the Loire, and E. by the Saône. The surface is diversified and the soil moderately fertile. Fair wines, coal, iron, manganese, leather, glass, and linen, cotton, and woollen goods are produced. The great iron works of Le Creuzot are in this department. It is divided into the arrondissements of Charolles, Châlon-sur-Saône, Louhans, Mâcon, and Autun. Capital, Mâcon.

SAÔNE, Haute. See HAUTE-SAÔNE.

SÃO PAULO. **I.** A S. province of Brazil, bounded N. by Minas Geraes, E. by Rio de Janeiro and the Atlantic, S. by Paraná, and W. by Matto Grosso; area, 93,547 sq. m.; pop. in 1871, 835,000. The coast, 250 m. long, is fringed by numerous islands, the largest being that of São Sebastião. The best harbor is that of Santos. The Serra do Mar, forming the edge of the great Brazilian plateau, skirts the coast; its average height is 2,750 ft. On the W. side the country declines gently toward the plains of the Paraná basin. This region is watered by large rivers, mostly navigable for several hundred miles; the principal are the Grande and the Tieté, tributaries of the Paraná, which forms the W. boundary line of the province. The gold mines of Jaraguá were long famous. Pompeio sets down the yield of all the gold mines up to 1800 at 116,250 lbs. Silver, copper, and iron also occur, and diamonds, rubies, and other precious stones have been found. Valuable coal mines have recently been discovered. The climate in the west is mild, but on the coast it is hot. The soil is very rich, and the chief articles of cultivation are coffee, cotton, tobacco, sugar cane, maize, sweet potatoes, mandioca, and black beans. The value of the coffee exported in

1870-'71 was \$5,600,000, one fifth of which was to the United States; of the cotton, \$1,800,000, half of which went to England. In 1873 there were 624 public schools, with 16,264 pupils. **II.** A city, capital of the province, 40 m. N. N. W. of Santos, its port, and 225 m. W. by S. of Rio de Janeiro; pop. about 20,000. It stands on high ground, almost surrounded by a low plain. The streets are narrow and irregular, but well paved and lighted with gas; the houses are of adobe. The cathedral, a parish church, and several other churches attached to convents or nunneries, the bishop's and the president's palaces, the city hall, prison, three hospitals, and three stone bridges are noteworthy structures. São Paulo was founded by Jesuits in 1552; in 1712 it was incorporated as a city, and in 1746 was erected into a bishopric.

SÃO PEDRO DO RIO GRANDE DO SUL (formerly abbreviated to Rio Grande do Sul, now to São Pedro). **I.** The southernmost province of Brazil, bounded N. by Paraná, N. E. by Santa Catharina, S. E. by the Atlantic, S. W. by Uruguay, and N. W. by the Argentine Republic; area, 73,836 sq. m.; pop. in 1872 (estimated), 455,000, including several thousand Germans and about 84,000 slaves. The Serra do Mar traverses the province near the coast from N. to S., and the Serra Geral runs E. to W., none of the peaks rising more than 3,200 ft. above the sea. The S. and W. parts are level, and the coast is low and sandy. Parallel to the coast in nearly its whole extent are Lake Merim, 115 m. long and 15 m. wide, and the lagoa dos Patos, 150 m. long and 40 m. wide, united by a natural canal, São Gonzalo, 50 m. long, and communicating with the ocean through the estuary called Rio Grande do Sul, which extends from the S. end of the lagoa dos Patos and empties into the Atlantic over a dangerous bar. Besides the Uruguay, which flows on its N. and W. border, the principal rivers are the Ibicuy, 350 m. long, a tributary of the Uruguay; the Jacuy, navigable for 250 m., emptying into the lagoa dos Patos; and the Jaguarão, 175 m. long, falling into Lake Merim. The W. shores of the lakes are verdant plains intersected by small streams, and producing all the cereals and fruits of the temperate and tropic zones, with flax, hemp, sugar cane, cotton, and tobacco. Ipecacuanha, sarsaparilla, turpeth, camomile, and indigo abound. The forests afford abundant timber and a great variety of cabinet woods. The province is rich in gold, silver, iron, copper, marbles, and particularly coal. Lead, granite, kaolin and other clays, ochres, and many varieties of precious stones are found. Cattle raising is an important industry. Mining is still limited. Railway and telegraph lines are now (1875) in course of construction through the province. Education is encouraged; in 1873 there were 446 public schools, with an aggregate attendance of 14,696 pupils. The chief towns are São Pedro, Pelotas, Pardo, and Porto Alegre, the

capital. **II.** A city of the preceding province, near the mouth of the Rio Grande do Sul, 159 m. S. S. W. of Porto Alegre; pop. about 18,000. The streets are irregular, but well paved. The harbor is the only good one in the province, nearly the entire trade of which, conducted mainly by English and Germans, centres here. Three lines of steamers run to Porto Alegre. The exports in 1872-'3 were valued as follows: hides, \$5,037,312; horse-hair, \$247,200; wool, \$149,544; maté or Paraguay tea, \$93,658; rum, sugar, coffee, and timber, \$6,897; total, \$5,534,611. The imports amounted to \$1,826,587. The arrivals from foreign ports were 929 vessels, tonnage 198,029; departures 698, tonnage 212,936; arrivals from Brazilian ports 840, tonnage 221,213; departures 890, tonnage 185,060.

SAP. See **PLANT**, vol. xiii., p. 582.

SAPAJOU. See **MONKEY**, vol. xi., p. 751.

SAPAN WOOD (Malay, *sapang*), a dyewood afforded by *Cesalpinia sapan*, imported from the East Indies and used to dye red on cotton. The genus, named in honor of the naturalist Cesalpinus, is also found in Central and South America and the West Indies, where some species afford Brazil, peach or Nicaragua, and other dyewoods (see **BRAZIL WOOD**), and another species the divi-divi pods used in tanning (see **DIVI-DIVI**).

SAPOR. See **PERSIA**, vol. xiii., p. 322.

SAPPHIRE (Heb. *sappir*; Ar. *safir*), a precious stone, next in value and hardness to the diamond. It is a transparent variety of corundum, composed of nearly pure alumina. It receives different names according to the color, the red sapphire being the oriental ruby; the amethystine, the oriental amethyst; the yellow, the oriental topaz; the green, the oriental emerald; while the term sapphire alone is commonly applied to the blue variety. The Greek sapphire (*ἀσπερος*) was not the gem here described, but the lapis lazuli, as appears from the description given by Theophrastus and Pliny. The blue sapphire is the *δάκρυδος* of the Greeks and the *hyacinthus* of Pliny. The ruby was probably included in the *anthrax* of Theophrastus and the *carbunculus* and *lychnis* of Pliny. The chemical formula of sapphire is Al_2O_3 , with a small quantity of oxide of chromium, upon the varying proportions of which the color of the different varieties depends. The coarser kinds of corundum contain several other oxides. (See **CORUNDUM**, and **EMERY**.) The sapphire crystallizes in the rhombohedral system, has a vitreous lustre, often pearly in the basal planes, and sometimes, when viewed in the direction of the vertical axis, exhibits a bright opalescent star. All sapphires, or pure varieties of corundum, are exceedingly tough and hard, being rated 9 on the scale of hardness, the diamond being 10. The gem is found in various parts of the world, and in different geological formations, as in the granite of Siberia, in the ripidolite of North Carolina, and in the granular lime-

stone of New Jersey. The finest ruby sapphires come from Pegu, Burmah, and Siam. Smaller ones have been found at Hohenstein in Saxony, Bilin in Bohemia, and Le Puy in France. The finest blue sapphires come from Ceylon.—The blue sapphire has been known from the earliest times, and was regarded by the ancients as a sacred stone. It is the fifth stone in the breastplate of the Hebrew high priest. A good blue sapphire of 10 carats is worth about 50 guineas, and one of 20 carats 200 guineas. An ordinary rule for estimating the value is to multiply the square of the weight in carats by half a guinea. Fine gems, for special reasons, often bring a much higher price; thus a sapphire of a barbel blue, weighing 6 carats only, brought at a public sale in Paris \$350. Notwithstanding its excessive hardness, the ancients executed fine engravings upon the sapphire. A remarkable intaglio by Cneius, cut in a sapphire, is in the Strozzi cabinet at Rome; it is a profile of the young Hercules.—The red sapphire, or ruby, is the most precious variety, a perfect one weighing more than $3\frac{1}{2}$ carats being more valuable than a diamond of the same weight; a perfect one of 5 carats is worth twice as much as a diamond of the same weight; and when they weigh 10 carats each, the ruby, if very fine, has three times the value of the diamond. According to Harry Emanuel ("Diamonds and Precious Stones," London, 1873), the finest and purest rubies have the following value: 1 carat, from £14 to £20; 2 carats, £70 to £80; 3 carats, £200 to £250; 4 carats, £400 to £450. The tint of the ruby is as fine by artificial light as by the light of day, and when of the finest tint it has the color of the centre of the red band of the solar spectrum, or that particular shade known by jewellers as "pigeon's blood;" but it varies from the lightest rose tint to the deepest carmine. A deep-colored ruby exceeding 20 carats is usually called a carbuncle. The largest fine ruby known in the world was brought from China to Prince Gagarin, governor of Siberia; it afterward came into the possession of Prince Menshikoff, and is now in the imperial crown of Russia. The mines of Burmah are a royal monopoly, and the finest stones can be carried out of the country only by smuggling. When a particularly large and fine stone is found, it is customary to send out a procession of grantees with soldiers and elephants to meet it. One of the titles of the king is "lord of the rubies." The yellow sapphire, called the oriental topaz, is very rare, but never reaches the value of a ruby or blue sapphire, or even an emerald of equal dimensions. It was the second stone in the breastplate of Aaron. It was for a long time supposed that the ancients did not engrave upon the topaz, but Caire describes one in his possession weighing 29 carats, engraved with the motto in Arabic, "No one accomplishes but God." The ordinary occidental topaz is a compound of alumina, silica, and fluoric acid.

(See **TOPAZ**.)—The violet sapphire is the oriental amethyst, a very rare gem of a magnificent lustre. It is the ninth stone in the breastplate of the Hebrew high priest, and is the sacred stone which ornaments the cross and the pastoral ring of Catholic bishops. It was often cut both in relief and in intaglio by the ancients. In the national library of France there is a splendidly wrought profile in amethyst, supposed to be Mæcenas in old age, engraved by Dioscorides, one of the four celebrated engravers mentioned by Pliny. The greater part of the amethysts of commerce are occidental amethysts, quartz crystals colored a fine violet by certain metallic oxides. (See **AMETHYST**.) The oriental emerald, the green variety of precious corundum, when of a beautiful green and perfectly transparent, is the rarest of gems. Specimens have been found in Montana territory. (See **EMERALD**.) When the sapphire is colorless it is called the white sapphire, and when properly cut and polished it has been mistaken for the diamond; but it is inferior in brilliancy, and may be distinguished by its somewhat less specific gravity, and by its being readily scratched by the diamond.—Specimens of sapphire have been found in the ripidolite of North Carolina by Col. C. W. Jenks, in large crystals of several hundred pounds weight. They occur in the native rock *in situ*, of different colors, possessing much beauty as mineralogical specimens, and some of them have been cut; but as they are traversed by cleavage planes, they do not possess the perfection of the eastern gems.—Artificial sapphires have been formed by Deville and Caron in small crystals by subjecting fluoride of aluminum to the action of boracic acid at a white heat, and adding various quantities of fluoride of chromium. A certain quantity yields the blue sapphire, somewhat more the ruby, and still more the emerald. Daubrée formed pure crystals by the action of chloride of aluminum on lime; Ebelmann by exposing to a high heat four parts of borax and one of alumina; and Gaudin by decomposing potash alum with charcoal.

SAPPHO, a Greek poetess, born at Mytilene or Eresus in the island of Lesbos, flourished about 600 B. C. She lived in friendly intercourse with her countryman Alcæus, and was married to Cercolas of Andros, by whom she had a daughter, Cleis. From Mytilene, where she lived, she was compelled by persecution to flee to Sicily, but whether she remained there until her death is not known. The common story that, being in love with a youth named Phaon, she leaped in despair from the Leucadian rock, probably originated in the myth of the love of Aphrodite for Adonis, who is called Phaon by the Greeks, while the leap from the rock is a metaphor used by many poets besides Sappho. Her poems are principally erotic compositions for the single voice, but she also wrote on a variety of other subjects, serious as well as satirical, and is

said to have first employed the Mixolydian mode in music. The Attic comic poets delighted in introducing her into their dramas as a courtesan; but Welcker, K. O. Müller, Neue, and other commentators have attempted to vindicate her character. The poems of Sappho were arranged by the later literary Greeks in nine books according to their metres; but only one complete ode, that to Aphrodite, and a number of short fragments, remain. She wrote in the Æolic dialect, and is said to have invented the metre which bears her name. It was formerly the custom to print her literary remains in editions of the pseudo-Anacreon, and it was not till 1733 that a separate edition of any portion of them appeared. Numerous collections and critical editions have since been published, the best being by Volger (1810), Neue (1827), Schneidewin (1838), and Bergk (1843). There are numerous translations.

SARACENS, originally the name of an Arab tribe, then applied to the Bedouins, afterward to the followers of Mohammed, and later to all the Moorish or Mohammedan people who invaded Europe, and against whom the crusaders fought. The classical writers do not clearly indicate the locality occupied by the tribe. Decius, it is said, let loose among them a number of lions, to punish them for their predatory habits. In regard to the origin of the name, some suppose that an Arab tribe claimed Sarah as their ancestress in order to escape the stigma of being descendants of Hagar; others, that the name was given to them in consequence of their roving and plundering life, from the Arabic *sarak*, to plunder; and others, that the word is a derivative of *sharak*, to rise, and hence signifies merely "an eastern people."

SARAGOSSA (Sp. *Zaragoza*). **I.** A N. E. province of Spain, in Aragon, bordering on Navarre, Huesca, Lérida, Tarragona, Teruel, Gualajara, Soria, and Logroño; area, 6,607 sq. m.; pop. in 1870 (estimated), 401,894. The surface is generally hilly. The valley of Caspe in the southeast is remarkably fertile. The Ebro flows S. E. through the province; other rivers are the Jalon, Gallego, and Jiloca. Lead, copper, tin, and sulphur are found, but few mines are in operation. Wheat, flax, hemp, silk, wine, and oil are produced. Little attention is paid to manufactures. The chief towns, besides the capital, are Tarazona, Calatayud, Daroca, Mequinenza, and Caspe. **II.** A city (anc. *Cæsarea Augusta*), capital of the province, on the right bank of the Ebro, at the junction of the Huerba and nearly opposite the mouth of the Gallego, and on the canal of Aragon, 170 m. N. E. of Madrid; pop. about 65,000. Although one of the most important cities in Spain, it is gloomy and antiquated, with narrow, irregular, and ill-paved streets. The canal and the crossing of two main railway lines have lately given the city an increased activity. There are two cathedrals, several churches, an academy of fine arts, a

large hospital, and a university established in 1474. The bridge over the Ebro was built in 1487.—Saragossa was founded by Augustus in 27 B. C., taken by the Goths about 470, by the Moors in 712, and by Alfonso I. of Aragon in 1118. It is famous for the two sieges it sustained in 1808, the first from June 16 to Aug. 14, when the French were repulsed with great loss, and the second from Dec. 20, 1808, to Feb. 21, 1809, when the city surrendered after one of the most desperate defences in history, and was held by the French till July, 1813. During the siege 54,000 persons in the city perished, of whom only 6,000 were killed by the enemy, the rest dying from an epidemic which broke out and which compelled the surrender.

SARAGOSSA, Maid of. See AGUSTINA.

SARATOGA, an E. county of New York, bounded E. and partly N. by the Hudson river, and S. by the Mohawk; area, 780 sq. m.; pop. in 1870, 51,529. The surface is mountainous in the northwest. Iron ore, sandstone, and limestone are abundant. The central portion abounds in mineral springs, principally at Saratoga and Ballston Spa. The Champlain canal passes along the E. and the Erie along the S. border, and it is traversed by several railroads. The chief productions in 1870 were 15,913 bushels of wheat, 173,599 of rye, 381,541 of Indian corn, 581,674 of oats, 144,985 of buckwheat, 1,236,915 of potatoes, 83,399 tons of hay, 194,792 lbs. of wool, 1,426,308 of butter, 83,277 of cheese, 52,296 of hops, and 38,316 of honey. There were 9,200 horses, 15,779 milch cows, 11,041 other cattle, 40,513 sheep, and 7,675 swine; 6 manufactories of boats, 8 of brick, 32 of carriages and wagons, 3 of cotton goods, 4 of woollen goods, 1 of linen, 1 of window glass, 1 of edge tools and axes, 3 of hardware, 6 of iron castings, 6 of machinery, 2 of engines and boilers, 12 of paper, 20 of saddlery and harness, 8 of sash, doors, and blinds, 4 of wooden ware, 10 tanneries, 16 flour mills, and 80 saw mills. Capital, Ballston Spa.

SARATOGA, Battle of. On Sept. 14, 1777, the expedition of Burgoyne crossed the Hudson by a bridge of boats and encamped on the heights and plains of Saratoga, near Fish creek, within a few miles of the northern division of the continentals under Gen. Gates at Stillwater. Kosciuszko had fortified Bemus's heights; the right wing occupied a hill nearest the river, and Arnold commanded the left wing about three fourths of a mile further removed. Next day the right wing of the British advanced to within 4 m. of the American lines, and on the 19th made a further forward movement of 2 m. It was led by Burgoyne, and consisted of Canadians and Indians, supported by a body of grenadiers and light infantry under Gen. Fraser. Gen. Morgan, who had been detached about noon with his sharpshooters to observe Burgoyne's movements, drove back the advanced guard, but coming upon the main column was compelled to retreat. Reinforcements coming up under

Arnold, a severe conflict ensued, commencing about 4 o'clock and continuing until dark. The loss of the Americans was within 400, that of their adversaries about 500. This contest is variously called the battle of Saratoga, Stillwater, and Bemus's heights. Frustrated in this attempt, his communications with Canada cut off by the seizure of the posts at the outlet of Lake George, and his supplies intercepted by the capture of a large fleet of boats with provisions and 800 men, Burgoyne's only hope was in Sir Henry Clinton, who had promised to attempt the ascent of the Hudson for his relief. He fortified his camp, but after waiting two weeks had no alternative but to hazard a battle. On Oct. 7, seconded by Major General Phillips and Riedesel, and Brigadier General Fraser, he advanced with 1,500 picked troops, two 12-pounders, two 6-pounders, and two howitzers, and offered battle to the American army. Scouts were sent out with orders to make a diversion in the rear, but they were discovered by the advanced guard of the Americans. Two detachments went forward, one under Gen. Poor against the British left and one under Morgan against their right. On the left the Americans advanced against the British grenadiers and artillery, and, having been joined by Arnold (who had rushed without orders to the head of the detachment, and assumed the command), took and lost the batteries again and again, until the enemy had been driven off and their own guns turned upon them. Morgan in the mean while had attacked the enemy's right under Fraser, who was fatally wounded by a sharpshooter. This, followed by a reinforcement of the Americans, threw the British into confusion, and Burgoyne, abandoning his artillery, retreated to his camp in good order. Here he was again desperately assailed, and the Americans carried a portion of the camp and drove off the Hessian reserve. Arnold, who led the last charge, was severely wounded in the leg. Night closed the contest; the victors lay on their arms near the battle field, and Burgoyne abandoned a portion of his camp and moved to the river. On the 9th he retreated to Saratoga, and on the 10th the whole British force occupied their former camp, which they proceeded to strengthen in the hope of succor from Sir Henry Clinton, should they not be able to effect a retreat. An American battery under Gen. Fellows commanded the passage across the river, the bridges on the road to Fort Edward were destroyed, and Gates with about 12,000 men appeared on the S. side of Fish creek prepared for battle. Without an avenue of retreat, continually exposed to the fire of Gates's and Fellows's batteries and the riflemen of Morgan, without provisions for more than a few days, and despairing of relief, Burgoyne, after consultation, on Oct. 13 proposed a cessation of hostilities until terms of capitulation could be agreed upon. Gates demanded an unconditional surrender, which

was rejected; and he finally agreed on the 15th to more moderate terms, influenced by the possibility of Clinton's arrival, which after some hesitation Burgoyne signed on the 17th. They provided that the British were to march out with the honors of war, and to be furnished a free passage to England under promise of not again serving against the Americans. These terms were not carried out by congress, and most of the captured army, with the exception of Gens. Burgoyne, Riedesel, Phillips, and Hamilton, were retained as prisoners while the war lasted. The Americans obtained by this victory, at a very critical period, an excellent train of brass artillery, consisting of 42 guns of various calibre, 4,647 muskets, and a large supply of ammunition. The prisoners numbered 5,804, and the entire American force at the time of the surrender was 10,817 effective men. A plan has been formed for the erection of a monument on the site of the surrender (Schuylerville), to be higher than that of Bunker Hill, with niches for bronze statues of the principal actors in the battle. The cost is estimated at \$450,000, toward which the state of New York has appropriated \$50,000.

SARATOGA SPRINGS, a town and village of Saratoga co., New York, on the Adirondack and the Rensselaer and Saratoga railroads, 32 m. N. by W. of Albany; pop. of the town in 1870, 8,537; of the village, 7,516; in 1875, 10,765. The mineral springs, which have given this place its celebrity, and its large elms, are almost the only natural attractions. Saratoga lake, 6 m. long by 2 m. wide, fed by Kayaderosseras creek and connected with the Hudson by Fish creek, is $3\frac{1}{2}$ m. E. of the village. On the S. E. shore is a valuable white sulphur spring. There are in all at Saratoga 28 springs (including 6 spouting), some chalybeate, others impregnated with iodine, sulphur, and magnesia, and all powerfully charged with carbonic acid gas. The most celebrated are the Congress, Empire, Hathorn, High Rock, Washington, Geyser (spouting), and Pavilion springs. High Rock spring, composed of calcareous tufa, narrows rapidly as it rises above the surface, and terminates $3\frac{1}{2}$ ft. above the ground in a rounded top, in the centre of which is a circular opening a foot in diameter 4 in. below the surface; the depth of the spring from the top of the rock is 32 ft. In 1789 the rock was entire, the water occasionally overflowing and increasing its size by deposits. Two years afterward a large tree fell upon and cracked it, since which time the water has kept on a general level 5 or 6 in. below the top. The waters of these springs are regarded as valuable aids in cutaneous and liver diseases, in some cases of confirmed dyspepsia, and in chronic affections of the bowels. They are generally tonic and greatly cathartic. At an early period the waters were evaporated in potash kettles, and the precipitated salts sold in small packages; but it was soon found that these salts did not reproduce the original wa-

ters on being dissolved. Large quantities of the waters, especially of the Congress, Empire, and Hathorn springs, are bottled and exported. (For analyses, see MINERAL SPRINGS, vol. xi., p. 593.) The village contains 7 large and 25 small hotels, 49 boarding houses, four banks, a large town hall, two assembly rooms, a female seminary, a water cure, five printing offices, a daily and three weekly newspapers, and eight churches. The number of visitors during the season, which lasts from June 15 to Sept. 15, ranges from 30,000 to 45,000.—The medicinal properties of the High Rock spring, or the "Round Rock," as it was called by the early settlers, were known to the Iroquois confederacy at the period of Jacques Cartier's visit to the St. Lawrence in 1535. In 1767 Sir William Johnson was carried hither on a litter by the Mohawks, and it is believed he was the first white man to visit the spring. The first log cabin was built in 1773 by Derick Scowton, and the first framed house in 1784 by Gen. Schuyler, who in the same year cut a road through the forest to the High Rock from Schuylerville. In 1693 a sanguinary battle was fought near the site of the present village between the French under De Manteth and the English led by Major Peter Schuyler, in which the latter were victorious. The name Saratoga (Indian, *Saraghoga*) signifies the "place of the herrings," which formerly passed up the Hudson into Saratoga lake.—See R. L. Allen, "Analysis of the principal Mineral Fountains at Saratoga," &c. (New York, 1858), and W. L. Stone, "Reminiscences of Saratoga" (New York, 1875).

SARATOV. I. A S. E. government of European Russia, bordering on Penza, Simbirsk, Samara, Astrakhan, the country of the Don Cossacks, and Tambov; area, 32,622 sq. m.; pop. in 1870, 1,751,268, of whom 120,000 were Germans. It is watered by affluents of the Don and of the Volga, which bounds it in the east. It formerly included a large territory E. of the Volga, which is now comprised in the governments of Samara and Astrakhan. The country is generally level, but skirted by hills along the Volga. II. A city, capital of the government, on the right bank of the Volga, 450 m. S. E. of Moscow; pop. in 1867, 93,218. It contains 12 Greek and several other churches, and a gymnasium. It is an important centre of trade and industry, and the population has lately much increased. A Greek bishop resides here, as well as a Protestant consistory with an extensive jurisdiction.

SARAWAK. I. An independent state in Borneo, under English control, extending about 300 m. along the N. W. coast from Cape Datu to Kidorong point, between lat. $0^{\circ} 30'$ and $3^{\circ} 20'$ N., and lon. $109^{\circ} 40'$ and $111^{\circ} 40'$ E., and inland at the furthest point about 100 m. The interior boundary, bordered by the Krimbang mountains, forms a curve which terminates in the capes mentioned. The surface varies from the lofty mountains scattered throughout the

interior, some of which are at least 6,000 ft. high, to the low, forest-covered, and fertile plains in the valleys of the numerous rivers, separated from each other by mountainous ridges. A few isolated mountains occur near the coast. The largest and deepest river is the Rejang, which flows into the sea N. E. of the capital, over a bar having five fathoms of water at high tide. The Sarawak river has a depth of $3\frac{1}{2}$ fathoms at its principal entrance, at low water. Between it and the Rejang is the Batang-Lupar, a third long river, which enters the sea with a width of 4 m. Of the secondary rivers the more important are the Samarahan, Sadong, Seribas, and Kalaka, in W. Sarawak; the Egan, a branch of the Rejang; and the Bintulu, near the E. frontier, on which stands a settlement of the same name. In the mountains nearest the coast limestone is the prevailing formation. The soil along the rivers is a rich alluvium, but clayey in the higher districts. Gold washing is carried on by the Chinese on many of the streams, and yields some profit. The chief metal product, however, is antimony, which occurs of the best quality, in exceeding abundance, and in many localities. Excellent coal deposits have been discovered, but as yet are only partially developed. Iron was formerly manufactured by the inhabitants from native ores, and arsenic and manganese are found, and small quantities of silver; but none of these metals are now worked. Forests over-spread the greater part of the country, yielding valuable timber, ebony, ironwood, sandal wood, gutta percha, caoutchouc, camphor, rattan, and bamboo. Agriculture is in a comparatively primitive state. Rice is cultivated in the lowlands, and cotton, pepper, tapioca, and tobacco in the more elevated districts. Maize, sugar cane, arrowroot, and nearly all the insular products of the archipelago are also raised. The climate is hot, with much rain from September to March, but not unhealthy.—The population of Sarawak is estimated at 300,000, composed of about 40,000 Malays, the Land and Sea Dyaks, a tribe in the east known as the Milanaus, some tattooed tribes of the interior, and about 3,000 Chinese. There are settlements on all the larger rivers. The founder of the present government was Sir James Brooke (see BROOKE), to whom in 1841 the sultan of Borneo proper ceded the town of Kuching, with the title of rajah. An additional cession was subsequently made, enlarging Sarawak to its present boundaries. Under his enlightened rule the country steadily advanced, from the complete anarchy in which he found it, toward peace and prosperity, notwithstanding a formidable Chinese insurrection in 1857, which was successfully suppressed after the slaughter or expulsion of about 2,000 Chinamen. When Sir James Brooke died in 1868, he was succeeded as rajah by his nephew Charles Brooke, under whom Sarawak has continued to prosper. A

system of associating the native chiefs with Europeans in the government was adopted at the outset, and has been maintained. Justice is simply and effectively administered through native local courts, where the Mohammedan code is applied under European supervision, and through the supreme court of the rajah at the capital. Complete religious toleration prevails; the English bishop of Labuan exercises spiritual jurisdiction in Sarawak, and there are several Protestant missionary stations in the country. A few regular troops are maintained. The revenue is derived through the sale of antimony, duties on opium, tobacco, and spirits, and a family tax of four shillings sterling. The total value of the foreign trade is over £300,000 annually, the principal exports being gutta percha, antimony, sago meal, camphor, wax, edible birds' nests, and rattans.

II. A town, capital of the state, on the Sarawak river, 17 m. from the sea, in lat. $1^{\circ} 28'$ N., lon. $110^{\circ} 8' E.$; pop. about 25,000, mostly Malays and Chinese, with a few English officials. It was formerly known as Kuching. The buildings extend along the bank, none of them at any very great distance from the river, and include the government house, an English Protestant church and mission house, and a mosque. Large vessels can enter the river, but cannot ascend to the town, the approach to which is commanded by a small fort. Sarawak is a free port, and carries on a large trade, chiefly with Singapore.

SARBER, a W. county of Arkansas, bounded N. E. by the Arkansas river, and drained by small tributaries of that stream; area, about 625 sq. m. It has been formed since the census of 1870. The surface is generally broken and hilly, but there are some prairies, which with the river bottom and valleys are fertile. There is some fine timber. Grain, grass, cotton, and tobacco grow well. Capital, Anderson.

SARCODE. See ANIMALCULES, and PROTOPLASM.

SARD, and **Sardonix**, precious stones, varieties of carnelian or chalcedony, named either from Sardis in Lydia, where they were originally found, or from the Greek *σάρξ*, flesh, in allusion to the flesh-like colors they sometimes exhibit. The sard is marked by concentric zones or small nebulosities in the middle of its ground, which distinguish it from red carnelian. Its color by reflected light is a dark reddish brown, almost black, and by transmitted light a deep red inclining to blood red. When it alternates in bands with white chalcedony, it is called sardonix (sard and onyx). The name was indefinitely applied by the Romans to the various agates and carnelians. Dufrénoy designates true flesh-colored agates as sards, those with alternating white stripes as sardonix, and the deep reddish brown or orange red agates as sardoines.

SARDANAPALUS, the last king of the Assyrian empire of Ninus, according to the ancient historian Ctesias. His effeminacy and licentious-

ness excited a rebellion, headed by Arbaces, satrap of Media, and Beleys, the noblest of the Chaldean priests. He defeated the insurgents in several battles, and, when at last forced to retreat to Nineveh, sustained a siege of two years. When it became evident that the city could be held no longer, he collected all his treasures and his women, and placing them on an immense pyre perished with them in the flames. The date of the event has been variously assigned to 876, 789, 710, 625, and 606 B. C. The utter impossibility of reconciling the chronology of this account with that given by other authorities, has led many writers to distrust the whole narrative, and to consider Sardanapalus a myth. K. O. Müller sought in an ingenious and elaborate essay to prove the identity of the god Sandon with Sardanapalus. Rawlinson is of opinion that the Sardanapalus of Otesias represents both Asshurbani-pal, in whose reign the Assyrian empire reached its greatest extent, and his successor Asshur-emit-ilin (according to him the Saracus of Abydenus), in whose time Assyria fell into the hands of the Medes. (See ASSYRIA.) Lenormant identifies him with the predecessor of Tiglath-pileser II., whose name Rawlinson gives the form of Asshur-lukh-khush or Asshur-lush, George Smith of Assur-nirari, and Oppert of Asshur-likhish; but Lenormant, assuming that there was in Assyrian a peculiar *itanaphal* form of conjugation, reads the name Asshur-tanagbal, whence, by a softening of the consonants, the Greek form Sardanapalus might easily have arisen. The first destruction of Nineveh, thus placed in the reign of Asshur-tanagbal (789 B. C.) by Lenormant, Oppert, and Dr. Hincks, is not believed to be historical by Rawlinson and many other scholars.

SARDES, or **Sardis**, an ancient city of Asia Minor, capital of Lydia, in the plain N. of Mount Tmolus, on the river Pactolus near its junction with the Hermus, about 45 m. E. of Smyrna. Ancient writers say the town was named after the god of the sun, and it is conjectured that it is identical with the Homeric Hyde. The early history and traditions of Sardes have been given in the article **LYDIA**. There are but few remains of the magnificent residence of Croesus, in whose time Sardes was one of the richest cities in the world. At the side of a steep hill, on which the walls of the acropolis are still standing, are the ruins of a theatre and other buildings. In the valley are the remains of a gymnasium, or perhaps a basilica, and on the acropolis stand two enormous columns, besides several others lying on the ground, supposed to belong to a temple of Cybele, which Herodotus mentions as having been burned by the revolted Ionians when they took the city in 500 B. C. On the other side of the valley is the necropolis of the Lydian kings. Prominent among the tumuli, and the largest of all, is that of Alyattes, which is circular and about 1,140 ft. in diameter. It was discovered that the tomb had been open-

ed years ago, and the excavations made here in 1868 by G. Dennis showed that most of the tombs in the necropolis had been rifled. A few mud huts in the midst of the ruins constitute the Turkish village of Sart. In the reign of Tiberius Sardes was visited by an earthquake which convulsed the whole face of the country, and reduced it, together with other important cities, to a heap of ruins. It was rebuilt by the aid of Roman benefactions, and it is supposed that either St. Paul or St. John preached here, and founded the church mentioned in the Apocalypse as one of the seven churches of Asia. The Seljuks captured Sardes in the 11th century, and in 1402 it was almost entirely destroyed by Tamerlane.

SARDINE, a small and well known fish of the herring family, and genus *alosa* (Cuv.). It is regarded by Valenciennes and most ichthyologists as identical with the fish called pilchard on the coasts of Great Britain, though Cuvier made it distinct, giving it the specific name of *sardina*. Its flesh is very delicate. The fishery employs a great number of men and women on the coasts of Brittany, and to a less extent of Portugal. Sardines are salted, or preserved in olive oil and butter and put up in tin cases for exportation. The larger fish are called *celans* in France, and pilchards in England; their shoals are preyed upon by codfish, and especially by porpoises. Fish of many other genera of the herring family are called sardines. In the East Indies species of *clupeonia*, *spratella*, *kovala*, and *Dussumiera* (the last named belonging to the *erythrinidae*) are placed on the table as sardines; in the West Indies *harengula clupeola* (Val.) is called the Spanish sardine, and *pellona Orbignyana* (Val.) in South America. The menhaden (*A. menhaden*) is called the American sardine, and is caught on the coast of New Jersey, put up in oil, and exported in large quantities.

SARDINIA (Ital. *Sardegna*; anc. *Ichnusa* and *Sardinia*), next to Sicily, the largest and most important island in the Mediterranean sea, lying N. of Africa, N. W. of Sicily, W. of southern Italy, E. of Spain and the Balearic islands, and S. of Corsica, and extending from lat. 38° 52' to 41° 16' N., and from lon. 8° 8' to 9° 50' E. On the west and south it is washed by the Mediterranean proper, and on the east by the Tyrrhenian sea, and it is separated from Corsica by a narrow strait called Bocche di Bonifacio; length 169 m., greatest breadth 96 m.; area, including several small adjacent islands, 9,399 sq. m.; pop. in 1872, 636,660. Its shape is oblong, and its coasts are generally steep and rugged, with deep indentations especially on the west and south. On the E. side are Capes Figari, Co da Cavallo, Comino, Monte Santo, Bellavista, Ferrato, and Carbonara, and the bays of Terranova, Orosei, and Tortoli. The gulf of Cagliari cuts a wide semicircular opening on the south between Capes Carbonara and Spartivento, beyond which are Cape Teulada and the bay of Teulada or of Isola Rossa. On the

W. shore, going northward, are the bays of Palmas and Oristano, the latter having at its entrance the promontories La Frasca and San Marco, and Capes Mannu, Marargiu, Caccia, Argentiera, Negretto, and Falcone. East of this last point the N. coast, after forming the gulf of Asinara, makes a semicircular sweep to Punta la Testa at the N. extremity of the island. The principal small islands lying off the coast are the group of Madalena, among which is Caprera, near the E. mouth of the strait of Bonifacio; the island of Tavolara, S. E. of Cape Figari; Aguilastro, S. of Cape Monte Santo; Serpentara and Costelazzo, near Cape Carbonara; San Antioco and San Pietro, W. and N. W. of the bay of Palmas; Mal di Ventre, opposite Cape Mannu; and Asinara, N. of Cape Falcone.—More than four fifths of the surface is occupied by mountains. The main chain, which runs N. and S. across the island, as well as its offshoots, belongs chiefly to the palæozoic formation; the N. range, called Monti di Limbara, is mostly granitic; while the hills extending through the centre from Porto Torres to Cagliari are of tertiary calcareous formation. In many parts of the island, and especially in the northeast, there are extinct volcanoes. The highest summit is the Punta Bruncu-Spina, in the Genargentu or central range, 6,290 ft. above the sea. In the opinion of geologists Sardinia was once united to Corsica, from which it has been severed by some volcanic convulsion. The rivers are numerous, but small; the most important are the Tirso, which flows S. W., drains the centre of the island, and falls into the gulf of Oristano, and the Orosei, Flumendosa, Mannu, and Coghinas. The principal lakes are those of Cagliari, Sarno, and St. Giusta. The island abounds in mineral resources, which are very imperfectly developed. Its ancient silver mines are abandoned, but there are many lead mines in operation. Iron, copper, mercury, antimony, granite, marble, porphyry, jasper, amethyst, gypsum, and alabaster are found, and large beds of coal have been discovered near Iglesias. Salt is obtained on the coast, and there are numerous mineral springs. The coral fishery is an important branch of industry.—The soil is peculiarly rich. Wheat and barley are produced nearly everywhere; maize is supposed to occupy about one fifth of the cultivated land. In the vicinity of Milis, near Cape Mannu on the W. coast, there is an orange forest, the trees in which are far larger than the finest seen in Portugal. Other fruits are also produced in abundance; and the wines are remarkable for spirit and flavor. Tobacco is raised near Sassari; cotton thrives near Cagliari; flax, hemp, and saffron are produced; and in recent times white mulberries have been extensively planted. The cork oak, pine, chestnut, and other trees clothe the slopes of the mountains almost to their summits. Skins of hares, rabbits, foxes, and martens are largely exported. The moufflon, an animal of the

sheep kind, which is believed to be indigenous to the island, frequents the highest and most secluded woods. An enormous quantity of cheese is made from sheep and goat's milk. The coasts abound in tunny, anchovies, pilchards, &c. The climate is agreeable, especially in the high grounds; the summer heat is not so overpowering as on the continent, and winter is comparatively mild, there being little snow except on the higher mountains. The low lands, which are mostly marshy, are subject in the autumn to deadly malaria, here called *intemperie*. Sardinia was anciently one of the granaries of Rome; but its prosperity has been seriously checked by a long period of misgovernment. It was not till 1836 that feudal tenure and feudal jurisdiction were entirely abolished. Besides the royal manufactories of gunpowder, salt, and tobacco (the last two being crown monopolies), there are a few of cotton, woollen, and silk goods, and some coarse pottery and glass works. The island is divided into the provinces of Cagliari and Sassari.—Sardinia was originally settled by the Phœnicians and Etruscans, and temporarily also by Greeks in the 6th century B. C. Its inhabitants, a mixed race called Sardi, were despised as rude and thievish. It was early conquered by the Carthaginians, and occupied by the Romans shortly after the first Punic war. In the 5th century A. D. it was seized by the Vandals, and in the 6th annexed to the Byzantine empire by Belisarius. The Saracens invaded the coasts in the 8th century, and subsequently established there a kingdom. They were finally expelled in 1022 by the Pisans and Genoese, who disputed its possession for nearly 150 years. In 1164 Frederick Barbarossa made the Genoese Barisone king of Sardinia, but in the following year he granted the island to Pisa. The old contest was renewed and carried on till 1175, when the emperor, as umpire, divided Sardinia about equally between the Pisans and the Genoese. In 1238 Enzo, natural son of Frederick II., became king, and in 1296 the crown was given by Pope Boniface VIII. to King James II. of Aragon as a vassal of the Roman see. After overcoming the Pisans, he became in 1326 the sole and uncontested ruler, and Sardinia remained subject to Spain till 1713, when by the treaty of Utrecht it was surrendered to the emperor Charles VI. of Germany. In 1720 he gave it in exchange for Sicily to Duke Victor Amadeus II. of Savoy, who assumed the title of king of Sardinia. (See SARDINIAN STATES.)

SARDINIAN STATES, or Kingdom of Sardinia, formerly a government of Italy, comprising the island of Sardinia, Piedmont (in the wider sense, including Saluzzo, Montferrat, and the W. part of the duchy of Milan), Genoa, Savoy, and Nice. The last two portions have been annexed to France, while all the other states, as well as Lombardy, which was united with Sardinia in 1859, are now embraced in the kingdom of Italy. Previous to the annexation of Lombardy and the cession of Savoy

and Nice, the Sardinian states extended over an area of nearly 30,000 sq. m., with a population of about 5,000,000. The origin of the kingdom dates from the negotiations which followed the treaties of Utrecht and Rastadt, and resulted in the quadruple alliance of Aug. 2, 1718. Victor Amadeus II. of Savoy, who assumed the title of king of Sardinia in 1720, resigned in 1730 in favor of his son Charles Emanuel III., but soon made an ineffectual attempt to recover the crown, and died a prisoner in 1732. Sardinia received numerous additions under Charles Emanuel III. His son Victor Amadeus III., who succeeded him in 1773, was finally overpowered by Napoleon in 1796, shortly before his death, and obliged to surrender Savoy and Nice to France. His son Charles Emanuel IV. was forced in 1798 to retire to the island of Sardinia; Piedmont was annexed to France, Sept. 11, 1802, and until 1814 continental Sardinia remained part of that empire. On his abdication in June, 1802, he was succeeded by his brother Victor Emanuel I., who was restored in 1814, and reestablished absolutism. Savoy was reannexed to Sardinia, and Genoa was added to it by the congress of Vienna. Victor Emanuel I., during a military insurrection headed by Santa Rosa and others, abdicated in 1821 in favor of his brother Charles Felix, in whose absence Charles Albert, of the younger line of Savoy-Carignan, assumed the regency, proclaimed the Spanish constitution of 1820, and established a provisional junta. Charles Felix, aided by Russia and Austria, was restored and undid his relative's work; but as the elder branch of the house of Savoy became extinct in his person, April 27, 1831, Charles Albert ascended the throne. In 1848 he promulgated the *statuto fondamentale*, which is the basis of the present constitution of Italy. He was involved in the same year in a war with Austria, was vanquished by Radetzky, renewed the war in 1849, and was utterly defeated at Novara, March 23. (See CHARLES ALBERT, vol. v., p. 300.) He abdicated, and was succeeded by his son Victor Emanuel II., who, after a war with Austria in 1859, in which he was aided by Napoleon III., annexed Lombardy and other states, and finally became master of all Italy. (See ITALY, SAVOY, and VICTOR EMANUEL.)

SARDIS. See SADEES.

SARDOU, Victorien, a French dramatist, born in Paris, Sept. 7, 1831. His early life was passed in penury, as a teacher and writer, and his first play (1854) was a failure. After his marriage in 1858 with Mlle. de Brécourt, an actress, he formed the acquaintance of Mlle. Déjazet, who brought out at her theatre several of his plays; but his reputation was not fully established until after the performances in 1861 of *Nos intimes*. Among his best known later plays are: *Candide* and *Les premières armes de Figaro* (1862); *Don Quichotte* (1864); *Les vieux garçons* (1865); *La famille Benoiton* (1865); *Patrie* (1869); *Fernande* (1870); and

L'Oncle Sam, a satire on American society (1872). His *La Haine* (1874) failed. He has made an immense fortune from his plays, in which striking plagiarisms have been detected.

SARI, or **Saree**, a city of Persia, capital of the province of Mazanderan, in lat. 36° 35' N., lon. 53° 6' E., about 15 m. from the S. shore of the Caspian sea; pop. about 20,000. It is surrounded by a dilapidated wall and ditch, has dirty unpaved streets, and contains many houses of burnt brick neatly tiled, several mosques and the remains of Parsee temples, a remarkable brick tower 100 ft. high with a conical roof, public baths, and five colleges.

SARGASSO SEA. See ATLANTIC OCEAN, vol. ii., p. 79.

SARGENT, Epes, an American author, born in Gloucester, Mass., Sept. 27, 1812. He studied in Harvard college, became connected successively with the Boston "Daily Advertiser" and "Atlas," and about 1839 removed to New York to take charge of the "Mirror." He next edited the Boston "Evening Transcript," but in a few years retired from journalism, and prepared popular "Speakers," "Readers," and other school books, and works for the young. He has written several very successful plays, including "The Bride of Genoa" (produced in 1836); "Velasco," a tragedy (1837); "Change makes Change," a comedy; and "The Priestess," a tragedy founded on the story of Norma. Among his other works are: "Life of Henry Clay" (1840); "Fleetwood, or Stain of Birth" (1845); "Songs of the Sea, and other Poems" (1847); "Arctic Adventures by Sea and Land" (1857); "Peculiar," a slave story (1863); "Planchette," a work on spiritualism (1869); and "The Woman who Dared," a poem (1869). He is now (1875) preparing a new work on spiritualism.

SARGON. See ASSYRIA, vol. ii., p. 35.

SARMATIA, in classical geography, the name of a vast region of eastern Europe and western Asia (according to ancient divisions). Ptolemy the geographer distinguishes between European and Asiatic Sarmatia. He describes the former as bounded W. by the Vistula and the Sarmatian mountains (N. W. Carpathians); S. by a line running from the Sarmatian mountains to the mouth of the Borysthenes (Dnieper), and thence along the coast of the Euxine to the isthmus of the Tauric Chersonesus (Crimea); E. by the Mæotis (sea of Azov), the Tanais (Don), and further N. by the meridian drawn from the source of the Tanais; and N. apparently from the gulf of Finland to the mouth of the Vistula, the regions beyond being unknown at the time. The boundaries of Asiatic Sarmatia he draws from the Cimmerian Bosphorus (strait of Yenikale) along the N. E. shore of the Euxine to the mouth of the Corax, a little above Dioscurias in Colchis; thence along Iberia and Albania to the Caspian sea, which forms the E. boundary as far as the river Rha (Volga), which completes the E. limit unto the un-

known north. The eastern part was inhabited by the Sarmatæ or Sarmatians proper, probably the Sauromatæ of Herodotus, according to him an Asiatic people derived from the intercourse of Scythians with the Amazons. The larger western division, corresponding to the Scythia of Herodotus, was peopled by the Venedi, Alani, Hamaxobii, Roxolani, Jazyges, and numerous other tribes of various race.

SARMIENTO, Domingo Faustino, an Argentine statesman, born in San Juan de la Frontera, Feb. 15, 1811. In 1826 he became director of a school in the province of San Luis, and from 1831 to 1836 he resided in Chili. In 1836 he founded a female school at San Juan, but in 1840 again went to Chili, where he greatly promoted education, publishing many school books and establishing numerous schools and colleges, including the normal school of Santiago, and editing several periodicals, mostly educational. He was the first to publish a daily paper in Santiago. In 1845 the Chilean government sent him to Europe and the United States, to observe the primary school systems of those countries, and on his return he published a work entitled *De la Educacion popular*. Returning to the Argentine Republic, he became successively minister of the interior, colonel of the Argentine forces, governor of the province of San Juan, and minister of public instruction. He was minister plenipotentiary to the United States from 1864 to 1868, when he was elected president of the Argentine Republic, assuming office Oct. 12. During his administration the war against Paraguay was brought to a successful termination, numerous insurrections were put down, railways and telegraphs were constructed, immigration was promoted, foreign commerce encouraged and extended, schools were multiplied, a national college was established in each of the provinces, and the national observatory was founded under the supervision of Prof. B. A. Gould. Many important institutions were introduced, mainly modelled after those of the United States. His term expired in October, 1874. His most important works are: *Manual de la historia de los pueblos antiguos; Arjirópolis, ó la capital de los Estados Confederados; Civilizacion i barbarie* (translated into French); *Viajes por Europa, Africa i América; Vida de Abrahán Lincoln; and Las escuelas*. The last two were published in New York.

SARNIA, or **Port Sarnia**, a town, port of entry, and the capital of Lambton co., Ontario, Canada, on the St. Clair river near Lake Huron, and on the Grand Trunk and Great Western railways, 168 m. W. S. W. of Toronto; pop. in 1871, 2,929. It is connected by ferry with Port Huron, Mich., on the opposite side of the river. It contains manufactories of iron castings, machinery, wooden ware, woollens, and leather, saw, grist, and shingle mills, a brewery, two branch banks, two telegraph offices, several schools, two weekly newspapers, and

Baptist, Episcopal, Methodist, Presbyterian, and Roman Catholic churches. The value of imports for the year ending June 30, 1874, was \$864,616; of exports, \$819,517.

SARNO, a town of S. Italy, on the Sarno (anc. *Sarnus*), in the province and 13 m. N. W. of the city of Salerno; pop. about 15,000. It is of great antiquity, and contains the remains of a once powerful castle, a fine cathedral, mineral springs, and manufactories of paper and silk, and is the seat of a bishop. In 553 the Goths under Teias were defeated in this vicinity, on the banks of the Sarno, by the Byzantine general Narses.

SÁROS, a N. county of Hungary, in the Cistibiscan circle, bordering on Galicia, Zemplén, Abauj, and Zips; area, 1,463 sq. m.; pop. in 1870, 175,292, chiefly Slovaks and Ruthenians. The Carpathians extend over the whole N. frontier, and their branches cover a large portion of the county. The Tarcza, Topla, and other rivers form fine valleys, which produce flax, hemp, grain, and fruit. In the mountains, where the climate is severe, oats only thrive, but they abound with timber, and with iron and other minerals and precious stones, of which the beautiful varieties of opal in Mt. Lillbánya are most celebrated. Linens and other goods are manufactured. There are great salt works at Sóvár, near Eperies, the capital, and mineral springs at Bartfeld and other places.

SARPI, Paolo (commonly known as Fra Paolo), an Italian historian, born in Venice, Aug. 14, 1552, died there, Jan. 14, 1623. He studied for 12 years in a convent of Servites, became a member of that order in 1565 (exchanging his baptismal name of Pietro for that of Paolo on his solemn profession in 1572), completed his course of philosophy and theology at Mantua in 1570, was appointed professor of theology in the university there, and afterward at Venice. He became provincial of his order in 1579, and went to Rome to draw up new constitutions for the Servites. In 1585 he was sent again to Rome as procurator general, and was taken into favor by Sixtus V. He studied natural science, and when recalled to Venice in 1589 he drew up an account of his discoveries in physics. According to Grissellini, Sarpi had discovered the circulation of the blood, and had been the first to observe the dilatation and contraction of the pupil of the eye, the effect of pure air injected into the lungs in case of asphyxia, and the various phenomena of the inclination of the magnetic needle. Although noted for austerity of life, the independence with which he expressed his opinions on religious matters caused him to be suspected by the Venetian inquisitors, and to be refused two episcopal sees which he had solicited. Pope Paul V., having vainly requested the abrogation of a law of Venice which he deemed contrary to the freedom of the church, threatened to lay the republic under an interdict. Sarpi thereupon published a pamphlet in which he assailed the papal pre-

tensions. On Jan. 28, 1605, he was appointed state canonist, and in 1606 issued a *Trattato dell' interdetto*, in which he exhorted the Venetians to disregard the threatened interdict. Consulted by the Venetian government on the most important matters of public policy, and allowed the free use of the state archives, Sarpi published elaborate answers, and *Come debba governarsi la repubblica veneziana per avere il perpetuo dominio*. These works have been condemned as advocating an odious system of duplicity and oppression. At the same time their author strenuously promoted an alliance between Venice and the new Dutch republic, while stimulating his fellow citizens to hostility toward the court of Rome. He was denounced as a schismatic and a Protestant, and an attempt was made upon his life, Oct. 5, 1607. He is now best known by his "History of the Council of Trent" (*Istoria del concilio tridentino*, fol., London, 1619; 4 vols. 8vo, Florence, 1858; Latin translation, London, 1620; English translation, 1629 and 1676). Another principal work of Sarpi was his *Istoria dell' interdetto* (4to, Venice, 1624; translated into French and Latin). The best complete edition of his writings was published in Naples (24 vols., 1789). His life has been written by the Italian liberal A. A. Bianchi-Giovini (2 vols., Zürich, 1836), and by A. G. Campbell, from original manuscripts (Florence, Turin, and Rome, 1875). An account of the controversy of Sarpi with the pope and the Jesuits is given by T. Adolphus Trollope in his "Paul the Pope and Paul the Friar" (London, 1860).

SARPY, an E. county of Nebraska, separated from Iowa on the east by the Missouri river, and bounded S. and W. by the Platte; area, about 275 sq. m.; pop. in 1875, 3,385. It is traversed by the Union Pacific and the Omaha and Southwestern railroads. The surface is diversified and the soil very fertile. Cottonwood abounds along the streams. The chief productions in 1870 were 95,233 bushels of wheat, 231,075 of Indian corn, 91,387 of oats, 12,135 of barley, 39,578 of potatoes, 107,655 lbs. of butter, and 7,465 tons of hay. There were 1,531 horses, 1,422 milch cows, 1,888 other cattle, and 1,927 swine. Capital, Bellevue.

SARRACENIA. See PITCHER PLANTS.

SARSAPARILLA (Span. *zarza*, a bramble, and *parilla*, a vine; i. e., a thorny vine), a drug consisting of the roots of various species of *smilax*. (See SMILAX.) There is no article of materia medica surrounded by so much uncertainty as sarsaparilla. Little is definitely known as to the plants which produce the varieties of commerce, and there is no agreement among medical men as to its remedial value. Sarsaparilla is collected in western Mexico, Central America, and the northern countries of South America, and the varieties are known by the names of the countries producing them, or those of the ports of shipment. Among the species to which it has been referred are *smilax officinalis* of Colombia and Jamaica,

S. medica of Mexico, *S. papyracea*, *S. syphilitica*, and others. The base of the stem in the different plants is enlarged to form a short, thick, woody, and knotted rhizome, from which proceed several long slender roots which run near to the surface, often as much as 9 ft. in length. These roots are collected, in some countries with and in others without the rhizome, dried, and made into parcels; the dried roots average about the size of a quill, are furnished with more or less rootlets or "beard," and longitudinally furrowed; they have an earthy smell and flavor. Examined with the microscope in cross section, the varieties present characteristic differences in the proportion and arrangement of the cortical, woody, and medullary tissues; in some kinds the cells abound in starch granules, on which account the commercial varieties are grouped as mealy and non-mealy sarsaparillas; the Honduras, Guatemala, and Brazilian belong to the first, and the Jamaica, Mexican, and Guayaquil to the other class. A crystalline neutral principle may be separated from the root, which has been called smilacine, salseparine, and parilline; the last, being the oldest, is the generally accepted name; it appears to be related to saponine, and like that froths remarkably when a solution of it is shaken. Sarsaparilla was introduced into Spain as early as 1545, and has since been at times a very popular medicine. Those physicians who regard it as of value class it as an alterative, and use it in inveterate venereal cases, chronic rheumatism, obstinate skin diseases, and in a generally depraved condition of the system. It is given in the form of decoction and sirups; the sirups contain guaiacum and aromatics, and are much used as a vehicle for medicines of positive efficacy, such as iodide of potassium and corrosive sublimate. The drug has a popular reputation as a "purifier of the blood," and a few years ago immense quantities of quack medicines were sold bearing the name, but containing not a particle of sarsaparilla. The sirup called sarsaparilla, so much drunk in soda water under the impression that it is healthful, rarely contains any of the drug.—Indian sarsaparilla is *hemidesmus Indicus*, of the milkweed family, the root of which is employed in India and sometimes in England for the same purposes. American or false sarsaparilla is *aralia nudicaulis*. (See SPIKENARD.)

SARTHE, a N. W. department of France, formed from the old provinces of Maine and Anjou, bordering on Orne, Eure-et-Loir, Loir-et-Cher, Indre-et-Loire, Maine-et-Loire, and Mayenne; area, 2,397 sq. m.; pop. in 1872, 446,603. The Loir, flowing through the S. part, and its tributary the Sarthe, through the W. part, are navigable, and there are many smaller streams. The productions include iron, coal, hemp, wine, cloth, gloves, candles, paper, and glass. It is divided into the arrondissements of Le Mans, Mamers, La Flèche, and St. Calais. Capital, Le Mans.

SARTI, Giuseppe, an Italian composer, born in Faenza, Dec. 28, 1729, died in Berlin, July 28, 1802. He studied counterpoint under Padre Martini, and his first opera, *Pompeo in Armenia*, was produced at Faenza in 1752. He was for a short time chapelmaster at Copenhagen, and in 1779 at Milan. About 1785 he became imperial chapelmaster and director of the conservatory in St. Petersburg. He remained in Russia till 1801, when he went to Berlin for his health. He composed operas and church music, and invented a machine to measure the vibrations of tones.

SARTO, Andrea Vannucci del, commonly called Andrea del Sarto, an Italian painter, born in Florence about 1488, died there in 1530. After passing some time in the workshop of a goldsmith, he took lessons in drawing from one Giovanni Barile, and subsequently studied under Pietro di Cosimo. But his real instructors were the cartoons and frescoes of Michel Angelo, Leonardo da Vinci, Masaccio, and Ghirlandaio. Having executed some oil and fresco paintings in conjunction with his friend Francesco Bigio in Florence, he painted in 1509, for the convent of the Servites, a series of frescoes from the life of St. Filippo Benizzi, and in 1514 the pictures of the "Epiphany" and the "Birth of the Virgin," which exhibit delicacy of sentiment and masterly execution, but lack dignity and grandeur of conception. His coloring is distinguished by sweetness and freshness of tone. His reliefs are singularly bold, and he was a thorough master of chiaroscuro. His illustrations of the life of St. John, which he began in 1514 for the *Compagnia dello Scalzo*, are in chiaroscuro, and were not completed before 1526. For Francis I. of France he executed the *Pietà*, or "Dead Christ," with the Virgin, St. John, and Mary Magdalen. The king invited him to Paris, and the picture of "Charity," which he painted there, is now at the Louvre. In 1525 he painted in the cloisters of the Servites one of his most celebrated frescoes, the *Madonna del Sacco*, so called from the sack of grain on which St. Joseph leans, which was admirably engraved by Raphael Morghen as a companion to Raphael's "Transfiguration." His principal picture of 1528, the "Madonna with the Saints," in the Berlin museum, has been injured by a clumsy attempt to restore it; and his "Sacrifice of Abraham," painted in 1529, is at Dresden. He possessed also an extraordinary talent for copying the works of other masters, and his copy of Raphael's Leo X. in the museum of Naples is invariably taken for the original. He was not always well paid for his pictures, but might have been prosperous, as he had many powerful and rich patrons, had he not yielded to the caprices of an extravagant wife. He returned from Paris with a considerable amount of money given him by the king to be invested on the royal account in rare works of art. Instead of appropriating this money to the prescribed use, Andrea squan-

dered it in riotous living; and thenceforth, says Vasari, "from an eminent position he sank to the very lowest, merely working for a livelihood, and passing his time as best he could."

SARUM, Old, an extinct city of Wiltshire, England, 2 m. N. of Salisbury. It was an important settlement of the early Britons, afterward a Roman station, and the residence of the West Saxon kings. It was fortified by Alfred, and was made a bishop's see in the 11th century; but the cathedral having been removed to the present site of Salisbury or New Sarum in the reign of Henry III., in consequence of a local quarrel, the place was deserted, and has not now a single habitation, though traces remain of its walls, castle, and cathedral. It was endowed by Edward III. with the privilege of sending two members to the house of commons; the franchise accompanied the estate, and the proprietor, after it had lost all its inhabitants, continued to return the two members regularly until the passing of the reform act in 1832.

SASKATCHEWAN, a river of British North America, in the Northwest territories, the upper course consisting of two branches. The North branch, issuing from Glacier lake on the E. slope of the Rocky mountains, in lat. 51° 54' N., lon. 117° 30' W., flows E. past the base of Mt. Murchison, and then generally E. N. E. to its junction with the South branch near lon. 105°, 12 m. above Fort à la Corne. The latter branch, formed by the junction of the Bow and Belly rivers from the Rocky mountains in lat. 49° 40', lon. 111° 40', flows N. E. to Chesterfield, where it receives the Red Deer river, then E. N. E. to the junction with the North branch. The main river thus formed, called by the Crees Kisiskatchewan (swift current), flows N. E. to the bend on the parallel of 54°, then S. E. to Cedar lake, from which it flows E. to the N. W. extremity of Lake Winnipeg. The area of the entire basin is 240,000 sq. m. From the source of the North branch to the junction the distance is about 550 m., and the length of the main river is about 200 m. The basins of both branches are generally too wild and mountainous, and the climate is too rigorous, to admit of much cultivation; but S. of the North branch is a fertile belt, to portions of which the Hudson Bay company reserves its rights since its surrender of territorial and governmental privileges in 1869. The mountains are heavily timbered. On both branches coal and iron are found. Bisons, rapidly disappearing in the Northwest territories, are now chiefly found on the North branch. The valley of the main river, except along its lower course, presents the best agricultural region with good grazing land. The river is frozen from the middle of November to the middle of April, and in summer is navigable by the Hudson Bay company's boats, though the North branch has a rapid current and shallow channel obstructed by bowlders. The settlements and

stations are distant from the river and near the lakes on account of the fish, which are there abundant. Nelson river, which issues from the N. extremity of Lake Winnipeg, is treated by some authorities as a continuation of the Saskatchewan, adding 350 m. to its length. (See NELSON RIVER.)

SASSAFRAS, a North American tree of the laurel family (*lauraceæ*), formerly called *laurus sassafras*, but separated from *laurus* on account of differences in structure by Nees von Esenbeck, who took the popular name for that of the new genus, and it is now *sassafras officinale*; the name is said to be of Spanish origin. The tree rarely exceeds 50 ft. in height, and in northern localities is much smaller; it extends from Canada to Louisiana, and is found beyond the Mississippi. In a young and vigorous tree the head is broad and round, with its branches in regular whorls, and the long and irregular spray curves upward, forming a



Sassafras officinale—Leaves, Flowers, and Fruit.

sharp angle with the branches. The bark on young branches is reddish green, and on old trunks reddish ash color with deep and irregular cracks. The leaves vary remarkably, some being ovate and entire, and others broad and three-lobed, and various intermediate forms occur on the same branch. The greenish yellow flowers are dioecious and apetalous, in umbel-like racemes, the calyx being six-parted; the sterile flowers have nine stamens, the anthers four-celled and opening by four valves; the fertile flowers have six rudiments of stamens, and a roundish ovary, which ripens into an ovoid, one-seeded drupe, the size of a large pea, of a deep blue color, and supported upon pedicels, which when the fruit is ripe become thickened and dark red. The sassafras deserves attention as an ornamental tree, for which it is much more used in England (where it was introduced in 1597) than here. All parts of it are more or less aromatic, from a volatile oil, which is more abundant in the

bark of the root than elsewhere; the wood, which is brittle in the growing tree, becomes when seasoned remarkably tough and light, and is used for fishing rods; the trunks are sometimes sawn into boards, which are used for trunks and drawers; it is said that no insects will be harbored by a bedstead made of the wood; sassafras poles have long been used for roosts in poultry houses, as their odor is disagreeable to hen lice. The young shoots and leaves are highly mucilaginous; the pith, obtained from the twigs, is kept in the shops, in slender cylindrical pieces, remarkably light and spongy and very mucilaginous when chewed; a dram to a pint of boiling water forms a demulcent drink in inflammatory diseases, and is used as a soothing eye wash; the mucilage differs from ordinary gum in not being precipitated by alcohol. The leaves when chewed are not only mucilaginous, but have a peculiar flavor unlike that of the bark; in Louisiana these are dried and pulverized, the fibrous portions being removed, and kept for thickening soups, and making gumbo when okra is not at hand. (See OKRA.) The fruit is strongly and unpleasantly aromatic, but is greatly eaten by birds. When the Europeans first visited this country they found the sassafras in use by the Indians, and the sick of Monardes's expedition (1562) having been cured by it, its reputation spread to Europe, and early in the 17th century it was regarded as one of the important articles to be derived from the colonies. The wood, which is much less aromatic than the bark, is still used in England, where it is imported in logs 6 to 12 in. thick with the bark on; these are cut into chips or shavings, which are used with guaiacum and sarsaparilla to make a sudorific drink used in skin diseases; a tea made of these chips, mixed with milk and sugar, called sallow, is sold in the streets of London to laborers as they go to their work in early morning. In this country the bark of the root is the only portion valued for its aromatic qualities; it is kept in the shops in the dried state in small fragments, which are used for flavoring official preparations; an infusion sweetened with molasses and fermented with yeast is used in the southern states as beer.—The oil of sassafras is yielded abundantly by the bark of the root; the roots are used in distillation, and the amount of oil varies with the proportion of the bark from 2 to 4½ per cent.; it is colorless or reddish brown, of specific gravity about 1.09, and when cooled by a freezing mixture deposits crystals of sassafras camphor. Baltimore is the headquarters for this oil, and the annual product is from 15,000 to 20,000 lbs.—In localities where the sassafras tree is abundant it is difficult to clear the lands, as it is very tenacious of life, and every piece of root left in the ground will throw up shoots; the most successful manner of eradicating it is by means of sheep, which will eat off the shoots as fast as they start up.

SASSANIDÆ, a dynasty of Persian kings founded by Ardeshir, called by the Greeks Artaxerxes, and considered the son of Babek and the grandson of Sassan, who overthrew the rule of the Arsacidæ, in A. D. 226. (See ARDESHIR, and PERSIA.) Under the Sassanian kings, and especially under Sapor (Shapur) I., Sapor II., Chosroes (Khosru) I., and Chosroes II., long and successful wars were carried on against the Roman and Byzantine emperors, the Persian empire was extended and consolidated, and the Zoroastrian religion was restored and maintained. The dynasty closed with Yezdegerd III., who in 641 was beaten by the caliph Omar in the battle of Nehavend, into which the Persians went 150,000 strong; he was murdered in 651 while asleep, for the sake of his splendid garments, by a miller in whose mill he had hidden. From the coins of this dynasty, of which an almost complete series has been gathered, it appears that the kings were men of extraordinary personal beauty, with large eyes, prominent well formed nose, and firm chiselled mouth. On some of the coins an eldest son or a queen is associated with the monarch. On the reverses are fire altars, which were apparently carried before the kings in processions.—See Thomas, "Early Sassanian Inscriptions, Seals, and Coins" (London, 1868).

SASSARI. **I.** A province of the kingdom of Italy, forming the N. portion of the island of Sardinia, bounded S. by Cagliari, and on all other sides by the sea; area, 4,142 sq. m.; pop. in 1872, 243,452. It is mountainous throughout. It is watered by the Tirso, Coghinas, Posada, and other small rivers. Wheat, barley, and cattle abound, and cheese and butter are largely exported. The province is divided into the districts of Alghero, Nuoro, Ozieri, Sassari, and Tempio Pausania. **II.** A city, capital of the province, on the Turritano, 10 m. from its mouth in the gulf of Sassari and 102 m. N. N. W. of Cagliari; pop. in 1872, 32,674. It is the seat of an archbishop, and contains an old fortified castle, a cathedral, a small university, which in 1875 had 66 students, a theological seminary, and other schools, the Vallombrosa and other palaces, and fine gardens. Oil is the chief article of trade. Its seaport is the neighboring Porto Torres.

SASSOFERRATO (GIOVANNI BATTISTA SALVI), an Italian painter, born in the castle of Sassoferrato, near Urbino, July 11, 1605, died in Rome, Aug. 8, 1685. He is frequently confounded with an earlier artist of the same name, who imitated Raphael. In style he followed the Carracci, with sweetness and delicacy. He painted landscapes, sacred portraits, and more rarely historical pieces. The Berlin museum contains many of his best pictures.

SATAN. See DEVIL.

SATIN BOWER BIRD. See BOWER BIRD.

SATIN SPAR, a name applied to two distinct minerals, which have a similar fibrous structure. The most common is a variety of gyp-

sum, the other a carbonate of lime. The gypsum mineral, softer than the other, is found in the counties of Nottingham, Derby, and Gloucester, England, near Carrickfergus in Ireland, and in gypsum beds in other localities. It is sometimes made into beads which have some resemblance to "cat's eye," but the latter is a hard quartz mineral. (See CAT'S EYE.) Beautiful specimens of carbonate of lime satin spar, of snowy whiteness, are found in Cumberland, Devonshire, and Buckinghamshire, England, and at Lead Hills in Scotland.

SATIN WOOD, a name for several woods of commerce, which when polished present a peculiar lustre; the principal kinds are the Indian and West Indian, or Bahaman. The Indian satin wood is produced by *chloroxylon Swietenia*, of the *meliceæ*, and related to the mahogany tree; it is 50 or 60 ft. high, found along the Coromandel coast and other parts of India; the wood is hard and yellow, somewhat resembling box wood, but darker. The West Indian wood is superior to the other, being of a light canary yellow; though considerable quantities are exported from the Bahamas, the tree which furnishes it is still uncertain; it has been conjectured that it is the wood of a species of *maba*, one of the ebony family. In some cases the wood is handsomely curled and mottled, and such pieces are cut into veneers for choice cabinet work; the ordinary kinds are chiefly used for the backs of brushes.

SATSUMA, the name of a province in the S. part of Kiushiu, Japan, and of the most noted of all the feudal clans in the empire. The fief of the daimio of Satsuma comprised Satsuma proper, Osumi, Hiuga, and the Loo Choo islands. Satsuma now forms the Kagoshima *ken* or district; pop., 1,183,000. The surface is mountainous, and the soil indifferent. Commerce, mineral wealth, and manufactures, especially of porcelain, have made this one of the richest provinces of Japan. The history of the clan dates from 1571, when Shimadzu Yoshihisa became daimio. After the battle of Sekigahara, the daimio of Satsuma was allowed by Iyeyasu to retain his territory. In 1609 Iyehisa, one of the Shimadzu family, conquered the Loo Choo islands, which the shogun allowed him to retain as part of his fief. The Satsuma clan has long been pre-eminent for the ability of its leaders, and for military ardor and prowess. During the Tokugawa shogunate they were the most restive under its rule, rendering only nominal obedience. The last but one of the daimios of Satsuma, who died in 1858, was the first to develop the impulse toward occidental civilization. He introduced foreign learning and measures when the shogun endeavored to repress such tendencies, and diligently prepared the way for the revolution of 1868. On Sept. 12, 1862, Shimadzu Saburo, his younger brother, having left Yedo with a grudge against the shogun, and cherishing a desire to embroil him with foreigners, was met on the

highway between Yedo and Yokohama by a party of English gentlemen and a lady, who were attacked by his procession, and Mr. C. L. Richardson, a merchant from Hong Kong, was killed. The British government demanded and obtained from the shogunate an indemnity of £100,000, and after the bombardment of Kagoshima, Aug. 13, 1863, the Satsuma men paid to the British an indemnity of £25,000. In 1868 the clan led the coalition that overthrew the shogunate, restored the mikado, organized the new government, and led the van at the battle of Fushimi. Satsuma has sent more students to foreign countries and furnished more able men than any other province. The clan also led the way in the abolition of the feudal system in 1872.

SATTARA, or Satara. I. A collectorate in the southern division of the province of Bombay, British India, separated by the Western Ghats from the Indian ocean, and situated S. of the district of Poonah; area, about 11,000 sq. m.; pop. in 1871, 1,028,520. The country forms part of the table land of the Deccan, and the surface is generally much broken and rugged. It is drained by the head waters of the Kistnah and its tributaries. The soil is generally barren, and in the western or more elevated part of the country the climate is cool and excessively moist. The Mahratta race predominates, and it was here that the great chieftain Sevajee rose to power in the middle of the 17th century. The state passed from his successors to the peishwa, whose territory was occupied by the British at the close of the Mahratta war of 1817-18. In 1819 they replaced the rajah, a descendant of Sevajee, upon the throne of his ancestors, under British protection. In consequence of certain intrigues he was deposed by his protectors in 1839, and his brother elevated in his place. The new rajah governed with great wisdom, and died in 1848 without issue, but adopted a boy distantly related to him a few hours before his death. It was decided by the British authorities that a dependent principality could not pass to an adopted heir without the consent of the paramount power; and Sattara was annexed to British India. Within its limits is the political agency of Sattara, superintending four native principalities, each governed by a descendant of a Mahratta chief or courtier, viz.: the Pant Pratinidhi, the Pant Sacheo, the Minbalkar of Phalkan, and the Daflekar, with areas respectively of 350, 500, 400, and 700 sq. m. **II.** A town, capital of the district, 115 m. S. E. of Bombay, in lat. $17^{\circ} 41' N.$, lon. $74^{\circ} 1' E.$, among the hills of the Deccan, E. of the ridge of the Ghats. The fort is on the summit of a steep mountain, E. of the town, about 800 ft. high. Sattara was taken from the Mussulmans by Sevajee in 1673, blockaded and captured by Aurungzebe in person in 1700, and retaken by the Mahrattas five years later. It was the residence of the rajah after his restoration by the British.

SATURDAY (Saturn's day), the seventh and last day of the week, and the Roman *dies Saturni*. It is the Jewish sabbath, and in the Catholic breviary is called *dies sabbati*.

SATURN (SATURNUS), an ancient mythical king or deity of Italy, to whom was ascribed the introduction of agriculture and civilization. According to tradition, he reigned on the Capitoline hill, hence also called the Saturnian hill, and after his death was translated to the abodes of the gods. His reign was called the golden age of Italy. With his wife, Ops, the representative of plenty, he was regarded as the protector of agriculture and of all vegetation which tended to the benefit of man, and he carried in his hand a crooked pruning knife. The Greek deity Cronus, with whom he was frequently identified, was the youngest son of Heaven and Earth, and the father of Jupiter, Juno, Neptune, and Pluto. He usurped the sovereignty of Heaven (Uranus), and instituted a reign of peace and plenty, called by the poets the golden age, to which succeeded the rule of Jupiter, who deposed and imprisoned his father. In later times his name was identified with χρόνος, time, and in the character of the destroyer he was represented as bearing a scythe, and as devouring his own offspring.

SATURN, the sixth planet in order of distance from the sun, the third of the superior planets, and in ancient systems of astronomy the outermost member of the planetary system, but now known to travel within the orbits of two planets at least, Uranus and Neptune. Saturn moves at a mean distance from the sun amounting to 872,137,000 m. The eccentricity of his orbit being considerable, his greatest and least distances are respectively 920,973,000 m. and 823,301,000 m., the difference, 97,672,000 m., exceeding by fully 6,000,000 m. the earth's mean distance from the sun. The eccentricity of the orbit is 0.055996. Since the earth's mean distance from the sun is 91,430,000 m., it follows that when in opposition to the sun Saturn is at a distance from the earth of about 732,000,000 m. when nearest to the sun, and of about 829,500,000 m. when furthest from the sun. It appears therefore that notwithstanding his relatively enormous distance, which necessarily operates to diminish the changes of his apparent dimensions on account of the earth's motions, Saturn is seen under very different conditions in different oppositions. For, remembering the difference of solar illumination when Saturn is in aphelion and perihelion, as well as the variation in the apparent size of his disk on account of his varying distance from the earth, we perceive that he must be more favorably placed for observation in a perihelion than in an aphelion opposition, in the ratio of $(829,500,000)^2 \times (920,973,000)^2$ to $(732,000,000)^2 \times (823,301,000)^2$; that is, approximately as 8 to 5. This ratio would also represent the range of varying brightness of Saturn in different oppositions were it not for the rings, which greatly modify

the apparent brightness of the planet. As the rings attain their greatest opening very nearly at the aphelion and perihelion of Saturn's orbit, the ratio just obtained fairly represents the relative brightness when he is in those parts of his orbit; but he appears much less bright relatively when at his mean distance than would be the case if he had no rings, for the rings then turn their edge almost exactly toward the earth. Saturn completes the circuit of his orbit in 10,759.2198 days, or 29 years 167.2 days, in an orbit inclined about $2^{\circ} 29' 58''$ to the plane of the ecliptic.—Saturn comes next to Jupiter in volume and mass. In fact, he surpasses all the remaining planets taken together nearly three times. His mean diameter is about 70,150 m., his polar diameter about 3,500 m. less, his equatorial diameter about 3,500 m. greater. His compression is about $\frac{1}{10}$. He exceeds the earth 697 times in volume; but his density is only 0.13 of that of the earth, so that his mass only exceeds hers about 89.7 times. He rotates on his axis in about $10\frac{1}{2}$ hours, and his equator is inclined about 27° to the plane of his orbit.—Saturn when first observed with the telescope by Galileo presented a triple appearance, as if two smaller orbs were symmetrically placed on either side of a larger one. Afterward Galileo supposed the planet had two appendages resembling handles (*ansæ*) in shape and position. Sometimes the *ansæ* appeared so large as to form a continuous ring; at other times they disappeared altogether. After they had been for some time invisible, they reappeared, and gradually increased in magnitude. Galileo and Hevelius were able to detect a dark space apparently enclosed within the rounded curve of the *ansæ*. Huygens explained these appearances as caused by an opaque, flat, thin, and circular ring surrounding the equator of Saturn, but nowhere touching the planet's globe. This ring being inclined to the ecliptic and moving always parallel to itself, it follows that for half the Saturnian year one side of the ring is illuminated, and for the other half the other side. When the ring is turned edge-wise either to the sun or to the earth, or when the earth is on the darkened side of the ring, it is invisible except in telescopes of great power. As the distance of the earth from the sun is very small compared with that of Saturn, it follows that the invisibility caused either by the ring's plane passing through the earth, or by the earth and sun being on different sides of the plane, must always occur when the planet is near one or other of the two points on its orbit where the plane passes through the sun. Later observations by Cassini, Bell, Sir W. Herschel, and others, but more particularly the recent observations of the Bonds at Harvard college and Dawes and Lassell in England, have added greatly to our knowledge of Saturn's ring system. The ring is found to consist of two chief bright rings separated by a circular gap; but each of the bright rings is probably divided

into several subordinate rings. But perhaps the most remarkable part of this remarkable system is a dark ring within the bright system of rings. This dark ring is so obvious with very moderate telescopic power that the idea is naturally suggested that it is a recent formation; and therefore the history of its discovery and of observations prior thereto deserves to be carefully noted. It appears from a paper by Galle of Berlin in the *Nachrichten*, No. 756, that a dark ring was seen with the large Berlin refractor in 1838. An account of Galle's observations, accompanied by drawings exhibiting the part of the ring seen across the body of the planet, was read by Encke before the Berlin academy in the same year. But little notice seems to have been attracted by this remarkable announcement; so that the actual discovery of the ring (made in such a way as to secure general recognition) must be attributed to Prof. G. P. Bond of Harvard and the Rev. W. R. Dawes in England, in November, 1850; Bond, who discovered the ring on Nov. 15, having the priority by a few days. Dawes at this time, and Bond somewhat later, called attention to the darkening of the inner bright ring toward the inside, where it adjoins on the dark ring. Dawes's account, when he announced the discovery of the dark ring, was as follows: "The exterior portion of the inner bright ring to about one fourth of its whole breadth was very bright; but interior to this the shading off did not appear, as under ordinary circumstances, to become deeper toward the inner edge without any distinct or sudden gradations of shade; on the contrary, it was clearly seen to be arranged in a series of narrow concentric bands, each of which was darker than the next exterior one. Four such were distinctly made out; they looked like steps, leading down to the black chasm between the ring and the ball. The impression I received was that they were separate rings, but too close together for the divisions to be seen in black lines." Later Capt. Jacobs at Madras recognized the fact that the dusky ring is semi-transparent, the outline of the globe of the planet being distinctly visible through the ring. On this account, and because of the peculiar aspect of the dark ring when it crosses the body of the planet, the name "crape ring" has been assigned to it. Otto Struve has shown that the inner or dusky ring is not a modern appendage to the planet, as might be suggested by the fact that it remained so long undiscovered; but that at the beginning of the 18th century the dark band thrown across the planet was distinguished from the shadow of the bright rings, and was called by observers the equatorial belt. Another curious result of Struve's researches was to show, by comparisons of measures made by Huygens, Cassini, Bradley, Sir W. Herschel, W. Struve, Encke, and himself, that "the inner edge of the inferior bright ring is gradually approaching the body of the planet, while at the same time the total breadth of

the two bright rings is constantly increasing." The theory now generally accepted respecting the rings is that they are composed of minute satellites, like sand on the seashore for multitude. The following table shows the position of the ring system and the proportions of the ring and globe:

Longitude of ring's rising node.....	167° 44'
Inclination of ring to the ecliptic.....	2° 10'
Annual precession of rising node.....	8.145"
Exterior diameter of outer ring in miles.....	166,920
Interior " " " ".....	147,670
Exterior diameter of inner ring.....	144,310
Interior " " " ".....	109,100
Inferior diameter of the dark ring.....	91,750
Breadth of outer bright ring.....	9,625
" of inner bright ring.....	17,605
" of division between rings.....	1,680
" of dark ring.....	8,660
" of system of bright rings.....	28,910
" of entire system of rings.....	87,570
Space between planet and dark ring.....	10,322

—Saturn is attended by eight satellites, the largest of which, Titan, sixth in order of distance from the planet, is the largest satellite of the solar system, and probably is as large as the planet Mercury. Much confusion prevails, as Sir John Herschel complains, in the nomenclature of the Saturnian satellites, owing to the order of distances not coinciding with that of discovery. The elements of the satellites, and the names of their discoverers, are as follows, counting from within outward:

No.	Sidereal revolution.	Distance in radii of ♄.	Diameter in miles.	Discoverer.
1....	Od. 22h. 37m.	3.3607	1,000?	Sir W. Herschel.
2....	1 8 53	4.3125	.....	do.
3....	1 21 18	5.3396	500?	G. D. Cassini.
4....	2 17 41	6.8398	500?	do.
5....	4 12 25	9.5528	1,200	do.
6....	15 22 41	22.1450	3,000	C. Huygens.
7....	21 7 8	26.7584	?	W. Bond.
8....	79 7 54	64.3590	1,800	G. D. Cassini.

Saturn's surface is marked by belts, somewhat similar to Jupiter's. Owing to the inclination of Saturn's equator, his belts afforded an opportunity, wanting in Jupiter's case, for testing the question whether the sun is the chief agent in causing the belts. It is clear that if this were so the belts would follow the sun, the equatorial zone, a well marked band of whitish color, remaining no longer equatorial when the sun was far to the north or south of the Saturnian celestial equator. And as the sun viewed from Saturn takes more than 29 years in completing the circuit of the star sphere, being half that time north of the Saturnian equator and the remaining half south of that circle, it is clear that there would be ample time for the sun to draw the cloud zone north of Saturn's equator during the summer of Saturn's northern hemisphere, and south of the equator during the summer of Saturn's southern hemisphere. This would happen if the sun caused and therefore ruled the Saturnian cloud belts, as he causes and rules the great cloud belt of the zone of calms. But in Saturn's case nothing of this kind is observed. His great

equatorial cloud zone remains equatorial all the year round. No clearer evidence could be desired of the fact that this cloud zone is neither sun-raised nor sun-ruled, but is due to some cause in the Saturnian globe itself. This cause can be no other, it would seem, than an intense heat pervading the whole globe of the planet. For other reasons, drawn from a consideration of the condition of Jupiter and Saturn on the nebular hypothesis, Prof. Peirce has recently adopted the opinion that these two great planets are thus instinct with their primeval fires.—Measurements of Saturn have led to the singular result that the planet appears to vary in shape. The disk is usually elliptical, but sometimes shows a figure in which the two diameters from 45° Saturnian latitude N. to 45° S. appear the greatest, the equatorial diameter less, and the polar diameter the least. This appearance has been called Saturn's "square-shouldered" aspect. It was first noticed by Sir W. Herschel, and as he recognized it with different telescopes he was satisfied that it was not a mere optical delusion. It has since been noticed by other observers, as the Bonds, Airy, and Coolidge, who possessed far too great skill in observing to be readily deceived in a matter so simple. It has been ascribed to optical illusion, but probably without sufficient ground. In fact it has never been shown why the illusion should be noticed at one time and not at others, or how it can be occasioned. It appears to the writer that a sufficient, a reasonable, and a probable interpretation is afforded by the theory that the atmosphere of Saturn is subject to changes, either by the formation and precipitation of cloud masses at an enormous elevation, or in some other way, which cause the apparent figure of the disk to alter while the real globe of Saturn, far within the visible boundary, remains unchanged in shape. This theory corresponds well with results to which the study of the planet Jupiter seems to lead us, as already shown. (See JUPITER.)

SATURNALIA, the festival of Saturn, celebrated originally by the rural population of ancient Italy in December, as a sort of harvest home, and in later ages converted into a season of almost absolute relaxation and merrymaking. Its origin was ascribed to Janus, Hercules, and others. Tullus Hostilius is said to have revived games of the Saturnalia and Opalia at Rome, in honor of Saturn and Ops, to commemorate a victory over the Sabines. During the republic a single day in the middle of December was set apart for its celebration, although the whole month was considered as dedicated to Saturn; but under the emperor Augustus the term was made to embrace Dec. 17, 18, and 19, to which a fourth day, and under Caligula a fifth, was added. It would seem, however, that under the emperors the festivities in reality lasted seven days, and included three separate festivals, the Saturnalia proper, the Opalia, and the Sigillaria, so called from the little

earthenware figures given to children as presents. During the Saturnalia no business of any kind was transacted, the distinctions of rank were forgotten, the utmost freedom of speech was permitted, and crowds perambulated the streets, wearing the *pileus*, the emblem of liberty, and shouting *Io Saturnalia*, much in the same spirit as in the modern carnival time; while within doors feasting and revelry were indulged to an inordinate degree.

SATYRS, in Greek mythology, a class of rustic divinities under the government of Bacchus, and forming part of his retinue. They are represented as robust and rough in appearance, with the heads and bodies of men, but with ears pointed like those of animals, and short horns and tails. They were frolicsome and addicted to various kinds of sensual enjoyment. Hesiod describes them as a good-for-nothing race. They were represented as the sons of Hermes and Iphthima. The older ones were called Sileni. The satyrs are sometimes confounded by the Latin poets with the Italian fauns, although originally distinct beings, and in ancient pictures and bass reliefs so represented. One of the most celebrated statues of antiquity was the satyr of Praxiteles at Athens. The word is used by Pliny to indicate a kind of ape.

SAUK, a S. W. county of Wisconsin, drained by the Barraboo river, and traversed by the Chicago and Northwestern railroad; area, about 900 sq. m.; pop. in 1870, 23,860. The Wisconsin river crosses the N. E. corner and borders the county S. E. and S. The surface is hilly and well timbered, and the soil fertile. The chief productions in 1870 were 487,416 bushels of wheat, 410,710 of Indian corn, 510,125 of oats, 210,518 of potatoes, 29,573 tons of hay, 61,081 lbs. of wool, 513,080 of butter, and 1,250,269 of hops. There were 6,030 horses, 7,250 milch cows, 8,601 other cattle, 18,766 sheep, and 13,374 swine; 7 manufacturing establishments of carriages and wagons, 3 of furniture, 2 of machinery, 2 of woollen goods, 1 blast furnace, 2 iron foundries, 5 flour mills, 10 saw mills, and 6 breweries. Capital, Barraboo.

SAUL (Heb. *Shaul*), the first king of Israel, son of Kish, of the tribe of Benjamin. He had four, or according to some six sons, three of whom, including Jonathan, the intimate friend of David, fell with their father in the battle against the Philistines at Mount Gilboa (about 1055 B. C.), and one of whom, Ishbosheth, for two years maintained himself as king of all the tribes except Judah. He had also two daughters, Merab, the first born, and Michal, the wife of David. (For the history of his reign see *HEBREWS*, vol. viii., p. 582.)

SAULCY, Louis Félix Joseph Caignart de, a French antiquary, born in Lille, March 19, 1807. He was an officer of artillery, and afterward keeper of the museum of artillery in Paris. In 1836 the French institute awarded him a prize for his *Essai de classification des suites monétaires byzantines*; and in 1842 he

became a resident member of the academy of inscriptions. He studied the Celtiberian, Phœnician, Egyptian, and cuneiform inscriptions; and in 1850 he explored the Dead sea and announced that he had found the ruins of Sodom, and had identified the "tombs of the kings" at Jerusalem as the royal sepulchres of Judah. He has published *Voyage autour de la mer Morte et dans les terres bibliques* (2 vols, 4to, with maps and drawings, Paris, 1852-'4); *Etudes sur la numismatique judaïque*, and *Histoire de l'art judaïque, tirée des textes sacrés et profanes* (1858); *Les expéditions de César en Grande-Bretagne* (1860); *Voyage en Terre-Sainte* (2 vols., 1865); *Les derniers jours de Jérusalem* (1866); *Histoire d'Hérode, roi des Juifs* (1867); *Étude chronologique des livres d'Esdras et de Néhémie* (1868); *Sept siècles de l'histoire judaïque depuis la prise de Jérusalem par Nebuchodonosor jusqu'à la prise de Bétir par les Romains* (1874); and *Numismatique de la Terre-Sainte* (1874).

SAULT STE. MARIE. See SAINT MARY'S STRAIT.

SAULT STE. MARIE, or *Sault de Ste. Marie*. **I.** A village and the county seat of Chippewa co., Michigan, on St. Mary's strait, at the foot of the rapids, and on the ship canal connecting the navigation of Lakes Huron and Superior, 290 m. N. by W. of Detroit, and 145 m. E. of Marquette; pop. in 1870, 1,213. The village is pleasantly situated on the site of an ancient French fort and missionary station. Fort Brady was built here in 1822 by the United States government, but it is now abandoned. The inhabitants are mostly French Canadians and Indians, and they subsist by exchanging furs, fish, and maple sugar with the vessels that touch here, for provisions and manufactured goods. The village contains three hotels and two churches, Presbyterian and Roman Catholic. **II.** A port of entry and the capital of Algoma district, Ontario, Canada, opposite the preceding; pop. in 1871, 879. It is pleasantly situated, and contains Episcopal, Roman Catholic, and Wesleyan Methodist churches. Many of the inhabitants are engaged in the fur trade and fisheries.

SAUMAISE. See SALMASIUS.

SAUMUR, a town of France, in the department of Maine-et-Loire, on the left bank of the Loire, 25 m. S. E. of Angers; pop. in 1872, 12,552. It is built partly on a steep hill surmounted by an old castle, now used as a town hall. A handsome bridge connects the lower town with a suburb on the opposite bank. Some of the churches are of great antiquity. Saumur has a celebrated school of cavalry, and manufactories of linen, glass, enamelled articles, leather, and saltpetre. It was formerly a stronghold of the Protestants, who had here an academy and a theological seminary, which were suppressed in 1685. In June, 1793, it was taken by the Vendéans, after a battle, and retaken by the republicans.

SAUNDERS, an E. county of Nebraska, bounded N. and E. by the Platte river, and drained by Cottonwood creek and other streams; area, about 750 sq. m.; pop. in 1875, 10,382. The Burlington and Missouri River railroad touches the S. E. corner. The surface consists of rolling prairies, and the soil is very fertile. The chief productions in 1870 were 55,652 bushels of wheat, 86,545 of Indian corn, 28,827 of oats, 15,273 of potatoes, 4,630 lbs. of wool, 41,525 of butter, and 5,730 tons of hay. There were 800 horses, 583 milch cows, 1,842 cattle, 1,351 sheep, and 1,335 swine. Capital, Ashland.

SAUNDERS, Prince, a Haytian lawyer, born in Thetford, Vt., about 1775, died in Hayti, Feb. 12, 1839. He was a negro, taught colored schools in Colchester, Conn., and Boston, Mass., and in 1807 went to Hayti. Christophe sent him to England to procure teachers, books, and school apparatus. The result not being satisfactory, Saunders returned to the United States, where he studied divinity, and preached for some time to a congregation in Philadelphia. He then returned to Hayti, and was appointed attorney general of the republic. He was the author of the criminal code of Hayti, and published several small works, including "Haytian Papers" (London, 1816).

SAUNDERSON, Nicholas, an English mathematician, born at Thurleston, Yorkshire, in 1682, died April 19, 1739. Before he was a year old he lost his sight by the smallpox. He became acquainted with Greek and Latin while young, and was instructed by his father in the rudiments of mathematics, afterward received instruction in algebra and geometry, and attended an academy near Sheffield. In 1707 he established himself as a teacher of mathematics and optics at Cambridge, and in 1711 was appointed on the recommendation of Sir Isaac Newton Lucasian professor of mathematics in Christ's college. He wrote "Elements of Algebra" (2 vols. 4to, 1740), and "The Method of Fluxions," including a commentary on some parts of Newton's *Principia* (8vo, 1756). He invented a method of performing arithmetical operations by touch.

SAUPPE, Hermann, a German philologist, born at Wesenstein, Saxony, Dec. 9, 1809. He studied in the universities of Leipsic and Zürich, and became professor in the latter in 1838. In 1845 he went to Weimar as director of the gymnasium, and in 1856 to Göttingen as professor of philology. He has edited many classical works, and in conjunction with Haupt a collection of Latin and Greek authors with German notes. He also edited *Don Carlos* in the great edition of Schiller (1867 *et seq.*).

SAURIANS, an order of scaly reptiles, including such as are popularly called lizards, skinks, monitors, geckos, iguanas, agamas, chameleons, &c., and the extinct iguanodon, ichthyosaurus, pterodactyl, and plesiosaurus. The ophisaurians, like the blindworm and amphibæna, have no limbs, and form the connecting

links between lizards and serpents. The saurians are all air-breathers, and the two lungs are about equally developed; the young undergo no metamorphosis, and the eggs are covered by a hard skin or shell; a few are viviparous. (See LIZARD.) The anal aperture is transverse, and the dermal or external skeleton is not bony like that of the *loricata* or crocodilians; the older writers, and some of the modern, place the crocodilians among saurians. This order is very numerous in genera and species, distributed most abundantly in tropical regions, where they are largest and most active. In their movements they come near the mammals, among them being found those which creep, others which walk, or run, or climb, or swim, or dive, or burrow, or fly. Their important subdivisions are treated under the popular names.

SAURIN, Jacques, a French Protestant clergyman, born in Nîmes, Jan. 6, 1677, died at the Hague, Dec. 30, 1730. His family went to Geneva after the revocation of the edict of Nantes. In 1694 he made a campaign in the English service as a cadet under Lord Galway, afterward served in Piedmont, and then returned to Geneva and studied theology. In 1701 he became pastor of the Walloon church in London. He remained there four years, and passed the rest of his life at the Hague, acquiring a great reputation as a preacher. His sermons, in several volumes, have appeared in many editions; a nearly complete translation of them has been published in German, and an abridged translation in English. Among his other works is *Discours sur les événements les plus mémorables du Vieux et du Nouveau Testament*, called "Saurin's Bible" (2 vols. fol., illustrated, 1720, to which Roques and Beaussobre added 4 vols.).

SAUROPSIDA, one of Huxley's three divisions of the vertebrates, embracing the birds and reptiles, characterized by absence of gills at any time of life, by skull jointed to spine by a single condyle, and by lower jaw of several pieces, united to the skull by an *os quadratum*, as distinguished from his division of *ichthyopsida*, including fishes and batrachians which have either permanent or deciduous gills. The affinities which justify the union of birds with reptiles are well seen in the fossil archæopteryx. (See ARCHÆOPTERYX.)

SAUSSURE, Horace Bénédict de, a Swiss naturalist, born at Conches, near Geneva, Feb. 17, 1740, died in Geneva, Jan. 22, 1799. He studied botany under his father and his uncle Charles Bonnet, and under Haller, and became familiar with many sciences. From 1762 to 1786 he was professor of philosophy at Geneva, and in 1798, after the incorporation of that city with France, of natural history at the central school of the department of Léman; and he founded the society of arts in Geneva. He made important researches in the Alps and other mountains, contrived the best kind of hygrometer or rather hygroscope, and perfect-

ed and invented other instruments, the best known being the cyanometer. In 1787 he ascended the summit of Mont Blanc, in 1788 of the Col du Géant, and in 1789 Monte Rosa. Cuvier regarded his *Essai sur l'hygrométrie* (Neufchâtel, 1783) as a remarkable scientific work, and attached the highest importance to his geological and mineralogical labors. His *Voyages dans les Alpes* (4 vols., 1779-'96), comprising also his exploration of other mountains, gave him the title of the "first painter of the Alps."—His son NICOLAS THÉODORE (1767–1845) became eminent in vegetable chemistry. His daughter ALBERTINE ADRIENNE (1766–1841), who married Jacques Necker, a cousin of Mme. de Staël, translated Schlegel's "Course of Dramatic Literature" (1814), and wrote *Notice sur le caractère et les écrits de Mme. de Staël* (1820), and *L'Éducation progressive* (3 vols., 1828-'32; 4th ed., 2 vols., 1864.)

SAUVEUR, Joseph, a French mathematician, born at La Flèche, March 24, 1653, died in Paris, July 9, 1716. He was mute until the age of seven, and his voice and hearing long remained imperfect, yet he made a new science of musical acoustics. He gained an introduction at court through Prince Eugene, and in 1686 became professor of mathematics at the collège de France. He determined the number of vibrations corresponding to each determinate sound, whether of an organ pipe or of a sonorous chord. His discoveries are described in numerous papers in the *Mémoires* of the academy of sciences.

SAVAGE, Marmion W., an Irish novelist, died in Torquay, May 1, 1872. After holding for many years a public office in Dublin, he settled in London in 1856, and for several years edited the "Examiner." His "Bachelor of the Albany," "My Uncle the Curate," "Reuben Medlicott," and "The Falcon Family" were originally published under an assumed name, to avoid compromising his official position, as they were strongly imbued with the spirit of young Ireland. He also edited with notes Richard Lalor Sheil's "Sketches, Legal and Political" (2 vols., London, 1855).

SAVAGE, Richard, an English poet, born in London, Jan. 10, 1698, died in Bristol, July 31, 1743. According to his own story, he was the illegitimate offspring of Anne, countess of Macclesfield, and Richard Savage, Earl Rivers, and at the age of 14 months was consigned by his mother to the care of a poor woman. The countess early disowned him, but her mother, Lady Mason, caused him to be placed in a school at St. Albans, after leaving which he was apprenticed to a shoemaker. Hearing by accident the secret of his birth, he assumed his father's name. Steele, Wilks the actor, and Mrs. Oldfield befriended him, and in 1723 he produced a successful tragedy, "Sir Thomas Overbury," in which he played the principal character. The publication of a volume of miscellanies soon after increased his reputation. In 1727, having killed a man in a drunken brawl, he was

tried and condemned to death. The countess of Hertford interceded with Queen Caroline in his behalf, and, despite the exertions of his mother to have the sentence carried into effect, on the ground that he had once attempted her own life, he received the royal pardon. On leaving prison he published his poem, "The Bastard." With a view of putting an end to scandal, Lord Tyrconnel, a relative of his mother, took him into his own house, where he was allowed an annual income of £200. For several years he led a life of excitement; but having quarrelled with his protector, he was again cast adrift. By the death of Queen Caroline soon after he was deprived of a pension of £50, and left to the charity of his friends, whom he gradually alienated. He was finally induced to retire to Swansea in Wales, and an annual stipend was contributed to his support by Pope and others. After the lapse of a year he started for London with a tragedy, and while passing through Bristol was arrested for a debt of £8, and died in the debtors' prison of that place. He also wrote "The Wanderer" (1729), a poem esteemed by him as his masterpiece, and a number of minor pieces. His works, with an account of his life and writings by Dr. Samuel Johnson, were published in 1775 (2 vols. 8vo).

SAVANNAH, the largest city and the commercial metropolis of Georgia, capital of Chatham co., on the right bank of the Savannah river, 18 m. from its mouth, and at the terminus of the Central, Atlantic, and Gulf, and the Savannah and Charleston railroads, 82 m. in a direct line and 104 m. by rail S. W. of Charleston, S. C.; lat. 32° 5' N., lon. 81° 5' W.; pop. in 1850, 15,312; in 1860, 22,292; in 1870, 28,235, of whom 13,068 were colored and 3,671 foreigners. The city is on a sandy plain about 40 ft. above the river, with one narrow street below the steep bluff, the warehouses upon which open below on the level of the piers, and from the uppermost story on the other side upon a wide sandy area called Bay street, which is divided by numerous carriageways and rows of trees. The whole city is regularly laid out with broad shaded streets, and at many of the principal crossings are open squares with trees. The corporate limits extend about 1½ m. back from the river, and include an area of 3½ sq. m. The water front extends in the form of an elongated crescent about 2½ m. Suburban settlements are fast springing up S. of the city limits. In this district a public park of 30 acres, called Forsyth place, has been laid out. Bonaventure cemetery, about 4 m. from the city, is reached by a fine drive. The principal other cemetery is Laurel Grove, belonging to the municipality. The residences are mostly surrounded with flower gardens, which bloom all the year. The most noticeable public edifices are the city exchange, court house, state arsenal, barracks, artillery armory, theatre, St. Andrew's hall, lyceum, Oglethorpe hall, Chatham academy,

custom house, market house, hospitals, and asylums. The custom house is of granite, 110 ft. long, 52 ft. deep, and 52 ft. high, and contains also the post office and United States court rooms. St. John's and Christ churches (Episcopal) are respectively Gothic and Ionic

edifices. Several other churches are very handsome and commodious, among which is the independent Presbyterian church, of granite, costing about \$130,000. The Georgia historical society has a large and beautiful hall. The reservoir is on a circular tower 80 ft. high;



Savannah.

new pumping works have recently been erected. There is a monument to Gen. Greene in Johnson square, and one to the memory of Pulaski in Monterey square, on the spot where he fell in the attack on the city in 1779. The harbor is one of the best on the southern coast. The depth of water on the bar is 19 ft. at mean low water, and 26 ft. at mean high water; within, at the Tybee roads anchorage, the depth is 31 ft. and 38 ft. respectively. Only 12 ft., however, at mean low water and 18 ft. at mean high water can be carried up to the city, and much dredging is required to keep the channel open in certain places to this extent. The river flows between marshy lands, which are intersected by numerous creeks and artificial channels, and are cultivated chiefly for rice. Long narrow islands and spits almost level with the water occupy a large portion of the space between the opposite banks, and reduce the main channel for a considerable part of the way between the city and the mouth to a width of a quarter of a mile and even less. From the city to Hutchinson's island, which extends about 6 m., is only about 600 ft. The chief defences of the river are Fort Pulaski, a strong fortification on Cockspur island, at the mouth of the river, built by the United States at a cost of \$988,859, and Fort Jackson on the right bank, 4 m. below the city, built at a cost of \$182,000. Steamers run regularly up the river to Augusta, and to New York, Boston, Philadelphia, Florida, and southern ports.—The chief business of Savannah is the receipt and shipment of cotton, though the trade in lumber is also

considerable. As a cotton port it ranks second in the United States. It recovered rapidly from the effects of the civil war, and the value of its commerce has since about doubled. The following table exhibits the shipments of cotton and the value of exports for ten years:

YEARS ENDING JUNE 30.	To foreign ports.		To coastwise ports.		Entire value of exports to for- eign ports.
	Bales.	Value.	Bales.	Bales.	
1866....	64,085	\$12,595,500	162,946	226,981	\$12,890,653
1867....	109,874	16,298,527	147,096	256,970	16,742,511
1868....	275,188	24,174,980	289,629	514,767	24,644,100
1869....	168,008	20,438,619	187,988	355,991	21,049,656
1870....	266,854	29,258,208	204,729	470,588	29,749,088
1871....	481,509	32,504,368	252,750	784,259	32,984,768
1872....	290,091	27,829,917	155,641	445,732	28,262,115
1873....	376,198	27,125,070	229,355	605,553	27,592,150
1874*....	178,479	12,277,160	189,110	817,589	12,440,283
1875†....	459,249	31,809,365	206,056	665,805	32,424,495

The value of imports from foreign countries in 1874 was \$788,220; of exports to coastwise ports, \$18,076,451; of all exports, \$50,500,946; tonnage entered in the foreign trade 297,619, cleared 189,399; entered in the coastwise trade 342,673, cleared 377,459. The number of vessels belonging to the port on June 30, 1874, was 80, with an aggregate tonnage of 22,170. The chief manufacturing establishments are several planing mills, founderies, and flouring and grist mills. There are a national bank, with a capital of \$750,000; three state banks, with an aggregate capital of \$9,000,000; and several building and loan associations.—The

* Six months ending Jan. 1.

† Year ending Jan. 1.

city is governed by a mayor and 12 aldermen, elected biennially. It has a good police force and an efficient fire department with a fire-alarm telegraph. The amount of taxable real estate and improvements is about \$14,000,000. The receipts into the city treasury during 1874 were \$988,320 65, of which \$362,869 65 were from loans; expenditures, \$975,991 61, of which \$353,505 were to pay floating debt and bonds. The funded debt on Jan. 1, 1875, amounted to \$3,600,140, on which the annual interest is \$251,052 90. The principal charitable institutions are the poorhouse and hospital, an orphans' home, a dispensary, and an infirmary. The public schools of the city and of the county of Chatham are under the management of a board of education of 12 members. The schools for white and colored children are separate. In the year 1874-'5 there were in the city 6,919 children of school age (3,853 white and 3,066 colored), and 13 public schools (10 white and 3 colored), all graded, with 61 teachers; average daily attendance, 2,453. The white schools include two Catholic institutions. Outside of the city there were 13 ungraded schools (4 white and 9 colored). The expenditures during the year for all the schools amounted to \$48,350 94, of which \$42,927 96 were for teachers' wages. The schools are free, being supported mainly by city and county appropriations. There are several private schools, and a medical college with 14 professors. Two daily (one German), one tri-weekly, and four weekly (one German) newspapers are published. There are 30 churches, viz.: 9 Baptist (7 colored), 1 Congregational (colored), 4 Episcopal (1 colored), 2 Jewish, 1 Lutheran, 4 Methodist (2 colored), 4 Presbyterian, 4 Roman Catholic, and 1 undenominational.—Savannah was founded in February, 1733, by Gen. Oglethorpe. The British attacked it on March 3, 1776, and were repulsed; but on Dec. 29, 1778, they took possession of the city. In October, 1779, the French and American army under Count D'Estaing and Gen. Lincoln attempted to recapture it, but were unsuccessful. In this engagement Count Pulaski fell, and the French lost 537 in killed and wounded, and the Americans 241. Savannah received a city charter in December, 1789. In November, 1796, a fire destroyed property to the value of \$1,000,000; and in January, 1820, another conflagration occurred, involving a loss of \$4,000,000. On Jan. 3, 1861, two weeks prior to the passage of the ordinance of secession by the convention of Georgia, Forts Jackson and Pulaski were seized by the state troops by order of the governor. During the war the place was occupied as a confederate military post and depot. It was the point on the sea to which Sherman's march from Atlanta was directed, and the first serious opposition which he encountered was about 15 m. N. W. of the city, the roads to which were obstructed by felled timber, earthworks, and artillery; but these

obstructions were turned, and on Dec. 10, 1864, the city was fairly invested. The entrance of the Ogeechee river into Ossibaw sound was guarded by Fort McAllister, a work of no great strength, having 23 guns mounted *en barbette*, a mortar, and a garrison of about 200 men. This fort was captured Dec. 13, with a Union loss of 90 men, and on the 17th Gen. Hardee, who had about 10,000 men at Savannah, mostly militia, was summoned to surrender by Sherman. Hardee refused on the ground that he still maintained his line of defence, and was in communication with his superior officers. Sherman then prepared to assault, but before his arrangements were completed Hardee abandoned the city and retreated to Charleston. The Union army entered Savannah on Dec. 21. Among the captures were 25,000 bales of cotton.

SAVANNAH RIVER. See GEORGIA, vol. vii., p. 716.

SAVARY, Anne Jean Marie René, duke of Rovigo, a French soldier, born at Marq, near Vouziers, April 26, 1774, died in Paris, June 2, 1833. He entered the army in 1790, superintended in 1804 the execution of the duke d'Enghien, became general of division in 1805, achieved in 1807 a victory at Ostrolenka, and received a large pension and the title of duke of Rovigo. Napoleon, after employing him in missions to Russia, sent him to Madrid, where he prevailed upon King Charles IV. and Prince Ferdinand to meet Napoleon at Bayonne, preliminary to their deposition. After the establishment of Joseph Bonaparte as king of Spain, he joined Napoleon at Erfurt, and remained his companion till 1810, when he succeeded Fouché as minister of police. In 1814 he accompanied Maria Louisa to Blois, and went on board the Bellerophon to accompany the emperor to St. Helena; but the English took him to Malta, whence he escaped to Smyrna. There he lost most of his fortune in commerce, and in 1819 he returned to Paris and obtained the reversal of the sentence of death which had been pronounced upon him in 1816. In 1823 he published an extract from his memoirs, in which he threw the blame of executing the duke d'Enghien on Talleyrand. The court was displeased at this, and he went to Rome, but was recalled to active service in 1831 as commander of the army in Algeria. His *Mémoires pour servir à l'histoire de l'empereur Napoléon* (8 vols., 1828) is one of the most valuable works on the first empire.

SAVE (anc. *Savus*; Ger. *Sau*; Hun. *Száva*), a river of Austria and Turkey, rises in the Carnic Alps, in the N. W. corner of Carniola, flows mostly E. S. E. through Carniola and Croatia, passing Laybach and Agram, and along the southern boundary of Slavonia, separating it from Bosnia and Serbia, and empties into the Danube between Belgrade and Semlin. It is about 550 m. long, and for most of its course winds sluggishly through an open country, often overflowing. Below the confluence of

the Kulpa it is navigable for vessels of 150 tons. Its principal affluents, all from the south, are the Kulpa, Unna, Verbas, Bosna, and Drina.

SAVIGNY, Friedrich Karl von, a German jurist, born in Frankfurt, Feb. 21, 1779, died in Berlin, Oct. 25, 1861. He studied at Marburg, where he lectured on the civil law from 1801 to 1804. In 1808 he was appointed professor of law at Landshut, and in 1810 at Berlin. In 1842 he was appointed minister of justice for the revision of the law, and in 1848 retired from political life. He published *Das Recht des Besitzes* (1803; 7th ed., 1865; English translation, "Treatise on Possession," &c., 6th ed., 8vo, London, 1848); *Geschichte des römischen Rechts im Mittelalter* (6 vols., 1815-'31); and *System des heutigen römischen Rechts* (8 vols., 1840-'49), to which *Das Obligationsrecht* (2 vols., 1851-'53) is an appendix.

SAVILLE, or Saville, George, marquis of Halifax, an English statesman, born in Yorkshire in 1630, died in London, April 20, 1695. He was the son of a baronet, and for his zeal in bringing about the restoration was created in 1668 Baron Savile and Viscount Halifax; in 1679 he was made earl, and in 1682 marquis of Halifax. In 1672 he was made a privy councillor, and in 1679 was admitted into the council of 30, and subsequently became one of Charles II.'s four confidential advisers. It was owing almost entirely to his oratory that the house of lords rejected the exclusion bill in 1680. He however defended Lord Russell, and denounced the withdrawal of the Massachusetts charter. On the accession of James II. he was obliged to give up his post as lord privy seal and accept the presidency of the council; but as he refused to support the king in the repeal of the test and habeas corpus acts, he was dismissed from office. He was appointed by James one of the commissioners to treat with William of Orange, but the flight of the king put an end to his mission. When parliament met he was appointed speaker of the house of lords, and supported the claim of William as king regnant, presented the crown to William and Mary on their accession, and was made lord privy seal. But he soon went into opposition, and acted for a short time with the Jacobites. He was the chief of the party contemptuously called trimmers, a name which he accepted and defended. He wrote "Character of a Trimmer," "Anatomy of an Equivalent," "Letters to a Dissenter," and "Maxims of State," all of which were printed in 1 vol. 8vo after his death. Several historical essays were published under his name. Two manuscript copies of his memoirs were both destroyed. The poet Henry Carey, ancestor of Edmund Kean, was his natural son.

SAVIN. See JUNIPER.

SAVINGS BANK, an institution for the deposit and safe keeping of small sums of money. Savings banks were originally established by benevolent individuals with a view to enable the poor to find places in which small savings

could be deposited on interest, and thus to offer inducements to make such savings. Unlike ordinary banks, savings banks do not usually lend money on personal security, but upon mortgage of real estate, stocks, and bonds of governments and incorporated companies. In some countries these banks are only permitted by law to invest in the national securities. The earliest savings bank of which there is any record was founded in Hamburg in 1778; but little is known of its history or operations. The next was in Bern, Switzerland, in 1787. In that country recently existed at Zürich the oldest savings bank in Europe, it having been founded in 1805. Francis Maseres in 1771 published in England a proposal that the rate payers of any parish should be incorporated for the purpose of receiving the savings of the people and of investing the same, and granting deferred annuities to the owners thereof. A bill based on this proposal passed the house of commons, but failed in the house of lords. In 1797 Jeremy Bentham suggested the plan of what he called "frugality banks" in connection with the management of paupers. In 1798 a "Friendly Society for the Benefit of Women and Children" was established at Tottenham High Cross, Middlesex, by Mrs. Priscilla Wakefield, and in or before 1801 there were combined with it a fund for loans and a bank for savings. In 1804 this bank was regularly organized with Mr. Eardley Wilmot, M. P., and Mr. Spurling as its first trustees. In 1799 the Rev. Joseph Smith of Wendover, Bucks, circulated in his parish proposals to receive sums on deposit during the summer, and to return them at Christmas with an addition of one third as a bounty on the economy of the depositors. The peasantry of the parish readily embraced this offer. In 1806 the "Provident Institution" of London was established. A savings bank was at first attached to it, but was soon discontinued, and the institution became simply a life insurance company. In 1807 the Rev. John Muckersy established in Scotland the "West Calder Friendly Bank for the Savings of the Poor." In 1808 a society was opened in Bath, chiefly through the instrumentality of ladies, for receiving the deposits of female servants. In 1810 the Rev. Henry Duncan, D. D., minister of Ruthwell, Dumfriesshire, Scotland, established a parish bank in that town, and at the end of four years had therein accumulated £1,160, at 5 per cent. interest. His attention had been directed to this subject by reading the writings of John Bone on social economy. He himself also wrote various essays, including "An Essay on Parish Banks." The institution established by him served as a model for various others. In gratitude to Dr. Duncan, a savings bank house was erected to his memory in the town of Dumfries soon after his death in 1846. In December, 1813, the Edinburgh savings bank was founded, mainly through the instrumentality of J. H. Forbes, who was connected with the

banking house of Sir William Forbes and co., and within three years he had received deposits amounting to £8,316 from 1,837 depositors. At first the rate of interest was 4 per cent., but after the first year it was fixed at 5 per cent. In January, 1815, the "Provident Institution of Bath," afterward called the Bath savings bank, was established. Southampton followed with a savings bank in November of the same year, Exeter in February, 1816, and Hertford in March. The bank of Exeter established agencies for receiving deposits throughout Devonshire, and within two years held deposits to the amount of £14,525. The Hertford bank had been preceded by the "Sunday Bank" established in the same place by the Rev. Thomas Lloyd. The first savings bank in Ireland was established at Stillorgan, county Dublin, in March, 1815. By the end of 1816 there were 74 in England and Wales, and 4 in Ireland. The first legislation by parliament for the regulation of these banks was "An act to encourage the establishment of banks for savings in England" and "An act to encourage the establishment of savings banks in Ireland," both passed in 1817. Among other provisions of these acts were those by which the trustees and managers of the banks were empowered to pay over the money received from the depositors to the bank of England or the bank of Ireland for the account of the commissioners for the reduction of the national debt, and as "the fund of the banks for savings," and the commissioners were to invest them in 3*d.* per cent. bank annuities and issue debentures bearing interest at the rate of 3*d.* per cent. per diem (£4 11*s.* 3*d.* per annum). In Ireland the trustees might place not more than one fifth of their deposits with bankers. Alterations as to England were made in 1817 and 1820, and in 1824 an act was passed covering both kingdoms. Between 1849 and 1857 the great frauds and defalcations in these banks had a tendency to destroy the confidence of the people in their stability. In 1861 the amount to the credit of depositors and the reserves of these banks were £41,546,475.—As early as 1806 Mr. Whitbread had proposed the establishment of savings banks in connection with the post office. In 1859, at the meeting of the social science association at Bradford, a paper was read on the subject by Mr. C. W. Sikes, of the Huddersfield banking company, which attracted the attention of the postmaster general and others; and finally a plan, to a great extent based upon Mr. Sikes's suggestions, was matured by George Chetwynd and Frank I. Seudamore, with the coöperation of Sir Rowland Hill. This plan, embodied in a bill, was carried through parliament by Mr. Gladstone, and became a law on May 17, 1861, and went into effect Sept. 17. By Dec. 31, 1862, the total balance on hand was £1,694,724. During the year 1873, 2,917,698 deposits were received, of the aggregate amount of £7,955,740, the average being £2 14*s.* 6*d.*

The total amount of deposits at the end of the year 1873 was £21,745,442. The rate of interest allowed is 2½ per cent., and the amounts received are from time to time paid over to the commissioners for decreasing the national debt, by whom they are invested in consols. Out of an amount due to depositors Dec. 31, 1872, of £19,860,874, but £301,070 remained on that date in the hands of the postmaster general. Similar systems have been successfully introduced into Australia and Canada. The rate of interest allowed by the ordinary savings banks of the United Kingdom is 3¼ per cent., and the deposits are invested in consols, which pay about 3·35 per cent. The total amount of deposits in these banks and post-office banks, as stated in parliament May 27, 1875, was £65,673,000.—In the United States the first savings bank was the "Philadelphia Saving Fund Society," suggested by Condé Raguet and organized in 1816. It still exists in a flourishing condition, and on Jan. 1, 1875, held deposits amounting to \$10,275,752 83. The second was established in Boston in the same year; the third in New York in 1819. In the various states there are laws regulating these institutions, and some of them are managed with great probity and have been eminently successful, although there have been very disastrous failures. Complete statistics of these banks are not accessible, but the following for 1874-'5 will give some idea of the business done by them in the United States:

STATES.	No.	Depositors.	Deposits.
Maine.....	....	90,898	\$29,556,498
New Hampshire.....	63	92,501	30,214,585
Vermont.....	....	16,200	5,751,002
Massachusetts.....	179	702,099	217,452,120
Rhode Island.....	....	98,124	46,617,164
Connecticut.....	....	205,510	72,205,624
New York.....	155	572,498	303,935,649
New Jersey.....	40	....	31,795,000
California.....	25	91,938	72,569,103

—In France the savings banks are under the surveillance of the state, and their funds are deposited in the *caisse des dépôts et consignations*, which is administered under guarantee of the public treasury, which pays the interest; but the depositors have no other security than the banks themselves. The earliest savings bank established in France was in Paris, July 29, 1818; there was one in Bordeaux in 1819, and one in Marseilles in 1821; these were joint-stock companies. Generally from 1821 they have been municipal institutions established by the town councils. In 1874 there were 508 savings banks in France, with 2,079,196 depositors, and deposits amounting to \$107,019,347. In 1875 a bill was discussed by the national assembly providing for post-office savings banks, but was rejected for several reasons, among others because the bill permitted women and minors to open accounts and withdraw deposits when no opposition was made by the husbands of the one or the parents of the

other class. Danger also was apprehended that if the government made itself responsible for too large sums of money payable on demand, difficulty might be experienced in their payment. In Belgium savings banks exist in most of the principal towns, and are under the direction of the towns themselves or of financial establishments. Switzerland has long been famous for its savings banks. In 1874 it had 303, with deposits amounting to \$57,600,000. In the various states of the German empire savings banks exist, one having been founded in Berlin as early as 1818. In Austria the deposits in these institutions amount to \$179,475,824. Throughout Europe the deposits in savings banks are estimated at \$1,180,000,000.

SAVOIE, a department of France. See SAVOY.

SAVOIE, Haute. See HAUTE-SAVOIE.

SAVONA, a fortified city of Italy, in the province, on the W. side of the gulf, and 23 m. S. W. of the city of Genoa; pop. in 1872, 24,851. It is very antique, has a large trade in silk, wine, and fruit, manufactures paper, cloth, firearms, soap, and glass, and is famous for its pottery. It has a cathedral dating from 1604, with fine wood carvings from an older one, a citadel, an arsenal, a naval school, a seminary, and a college. The port was filled up with hulks and stones by the Genoese in 1525-'8, but has been partly cleared out, and the work is still in progress (1875).

SAVONAROLA, *Girolamo*, an Italian reformer, born in Ferrara, Sept. 21, 1452, executed in Florence, May 23, 1498. In 1475 he became a Dominican at Bologna; and having completed his theological studies and received orders, he was sent in 1482 to the convent of San Marco in Florence to preach the Lenten station. His diminutive stature and harsh voice having caused him to fail in this, he was removed to the convent of Brescia, where he achieved such success as a pulpit orator that in 1489 he was recalled to San Marco in Florence. Applying the visions and prophetic denunciations of the Apocalypse to the vices and corruptions of the pagan renaissance in Italy, he assumed the character of a prophet. In 1493 he was appointed vicar general of his order in northern Italy, and was encouraged by the court of Rome to carry out a thorough reform in all Dominican houses. Soon afterward the pope made the reformed Dominicans of Tuscany an independent body under Savonarola. After the death of Lorenzo the Magnificent in 1492, the friar allied himself with the political party which favored the French domination in Lombardy, and his discourses pointed plainly to the speedy arrival of one who should liberate Florence from the yoke of the Medici and the corruptions of paganism. He was appointed one of a deputation to welcome Charles VIII. of France as the saviour of Italy, and to invite him to Florence in 1494. Thenceforward his influence was for a time all-powerful in the city. When the French evacuated Florence, a theocratic republic was proclaimed by his ad-

vice, in which Christ alone was to be sovereign, and legislation and public order were regulated on the ascetic principles of monastic life. He made war upon all amusements, proposed a rigid censorship of morals, and even demanded the deposition of the pope. A sentence of excommunication, which he disregarded, only increased his popularity. He continued his harangues, organized processions, and held public *autos da fê*, in which beautiful and licentious works of art were destroyed. But after a time the combination of the Medici with other powerful families, the hostility of the Franciscans, Savonarola's extravagant interpretations of Scripture, and the censure of the court of Rome, caused a sentence of banishment to be issued against him. He shut himself up in his convent of San Marco, but surrendered after a violent contest. Pope Alexander VI. demanded that he and his companions, Domenico Buonvicini and Silvestro Maruffi, should be sent to Rome. The Florentine council refused, but allowed the papal delegates to share in the trial. The prisoners were sentenced to death and strangled, and their bodies burned. Monuments to Savonarola's memory were erected in the convent of San Marco in 1873, and in Ferrara on the anniversary of his death, May 23, 1875. He left numerous ascetic and political writings and religious poems. In his *Triumphus Crucis* he strives to prove the truths of religion by philosophical arguments, and to bring the natural and supernatural together. In his work *De Divisione omnium Scientiarum* he rejects all pagan authors, and would substitute for these the study of the fathers. His works were partly published at Lyons (6 vols., 1633-'40), and portions have been translated into various languages. Among recent publications of his writings are *Prediche* (Florence, 1845), and *Poesie* (1862). His life has been written by Carle (Paris, 1842), Madden (London, 1853), and many others. The best biographies are by Perrens (2 vols., Paris, 1853; 3d ed., 1859), and by Villari (2 vols., Florence, 1859-'61; French translation by Gustave Gruyer, with collections of Savonarola's correspondence and poetry, 2 vols., 1874). Villari corrects the exaggerated accounts of his execution.

SAVOY (Fr. *La Savoie*), a territory of France, formerly an independent duchy and afterward part of the kingdom of Sardinia, between lat. 45° 4' and 46° 24' N., and lon. 5° 37' and 7° 15' E.; area, 3,888 sq. m.; pop. in 1872, 540,985. Its length from N. to S. is 92 m. and its greatest breadth from E. to W. 75 m. It is bounded N. by the canton and lake of Geneva; W. by the department of Ain, from which it is separated by the Rhône; S. W. by the departments of Isère and Hautes-Alpes, being divided from the former by the Guiers, a tributary of the Rhône, and from the latter by the Maurienne ridge, an offset of the Cottian Alps; and S. E. and E. by the Cottian, Graian, and Pennine Alps, with their ramifications projecting toward the lake of Geneva, which

separate it from Piedmont and the canton of Valais. This range contains the loftiest peaks and most magnificent glaciers in the whole Alpine system; among the former are Monts Blanc, Iséran, the Little St. Bernard, and Tabor; among the latter, Iséran and Chamouni. The country is intersected by several of its off-sets, viz.: the Alps of Savoy, branching from the Little St. Bernard, and covering with their ramifications most of the central and western districts; the Savoisan and Valaisian ridge, extending from the Pennine Alps to the lake of Geneva; and La Vanoire, which diverges from Mont Iséran and describes a curve toward the W. S. W. The streams generally rise in the main chain in the east, and flow directly or indirectly into the Rhône; the Dranse, which flows northward to the lake of Geneva, the Arve, Chéran, and Isère, flowing westward, are the most important. Besides its share of the lake of Geneva, Savoy has the smaller lakes of Bourget, Annecy, Morion, Haute-Luce, and Mont Cenis, and the subterranean lakes in the cave of Bauge. Mineral springs are abundant; those of Aix, St. Gervais, and Evian are the most famous; and there are intermittent springs at Pigros and Haute-Combe. Mines of argentiferous lead are wrought in various places, and there are mines of copper, iron, and lignite, anthracite, and bituminous coal, and quarries of marble, granite, slate, jasper, and porphyry. The forests furnish timber for ship building and other purposes. The extent of arable land is not considerable, but every acre is cultivated; the valleys, of which the most celebrated is that of Chamouni, present a succession of cultivated fields, orchards, and gardens; and the steepest declivities of the mountains are terraced and made productive. Wheat, oats, barley, rye, hemp, and fruits are extensively cultivated. Chestnuts form an important article of food among the poor. Vines thrive on the hills, and the wines are of good quality. Mulberry and walnut trees are cultivated, the nuts of the latter yielding oil. Numbers of cattle are reared. The rivers teem with fish, and the streams and lake at the foot of Mont Cenis, the Chéran, and the Guiers are famous for trout. The climate, though variable, is healthful and mild; the cold is severe only on the mountains. The inhabitants, in manners, language, and sympathies, have always been essentially French. They are kind, honest, hospitable, and intelligent, fond of their country and loath to leave it permanently, though as many as 30,000 of them find employment during the winters in France, Switzerland, Italy, and Spain. Nearly all of the non-migratory class are landowners, the soil being much subdivided. Agriculture is the chief pursuit, but there are many foundries and iron works, and linen, cotton, woollen, and other manufactories. Before its annexation to France, Savoy was divided into the provinces of Chablais, Faucigny, Genevois, Maurienne, Savoy Proper, Upper Savoy, and

Tarantaise. It now constitutes the departments of Savoie (the southern part) and Haute-Savoie. For the latter, see HAUTE-SAVOIE. The former has an area of 2,221 sq. m.; pop. in 1872, 267,958. It is divided into the arrondissements of Albertville, Chambéry, Moutiers, and St. Jean de Maurienne. Capital, Chambéry.—Savoy was originally inhabited by the Allobroges, Nantuates, and other tribes of Transalpine Gaul. Under the Romans it formed a part of Gallia Narbonensis. Subsequently it belonged to the kingdoms of the Franks and Burgundians. The last king of Arles, Rudolph III., early in the 11th century appointed Beroald, a descendant of the count of St. Maurice, as governor of Savoy. Count Humbert, however, who died about 1048, is generally regarded as the actual founder of the house of Savoy. He was a stepson of Rudolph III., and inherited the county of Maurienne, in addition to which he received from the emperor Conrad II., after the death of Rudolph and the permanent incorporation of Savoy with Germany in 1032, considerable fiefs, including Chablais and Vaud. His nephew Amadeus II., in right of his mother Adelaide, heiress to the marquisate of Susa, added a large part of Piedmont to the possessions of his house. Under Amadeus III. (1103-'48) the territory became in 1111 a county of the empire, and he was the first count of Savoy. Its domains were much enlarged under subsequent counts, especially Amadeus V. the Great (1285-1323). (See AMADEUS V.) Turin had become the capital previous to his reign. Amadeus VI., a chivalrous and adventurous prince, annexed Coni and other territories, and Amadeus VII. Nice. Under Amadeus VIII. (1391-1434) Savoy became a duchy in 1416 (see AMADEUS VIII.), and he reannexed Piedmont, which for about a century and a half had been in the possession of a younger branch of the family. Charles I. (1482-'9) conquered the marquisate of Saluzzo. Charles III. (1504-'53) became involved in the wars between Francis I. and Charles V., and lost nearly all his possessions, which were recovered by his son Emanuel Philibert (1553-'80), who also acquired additional domains. He was one of the most warlike princes of his house, commanded the Spanish army in the battle of St. Quentin (Aug. 10, 1557), after a struggle granted the Waldenses free exercise of their religion, and promoted agriculture, industry, and learning. The ambition of his successor, Charles Emanuel I. the Great (1580-1630), son-in-law of Philip II. of Spain, resulted in new spoliation on the part of France (see CHARLES EMANUEL I.); and his son Victor Amadeus I. (1630-'37) was soon after his accession obliged to conclude with his brother-in-law Louis XIII. of France the disastrous peace of Cherasco. The fortunes of the house of Savoy had been at a standstill for a long period when Victor Amadeus II. succeeded Charles Emanuel II., a peaceful prince, in 1675. After various

vicissitudes he recovered not only all its possessions, but acquired in 1713 a part of the duchy of Milan and the kingdom of Sicily, which he exchanged in 1720 for the island of Sardinia, with the title of king. (See VICTOR AMADEUS, and SARDINIAN STATES.) Thus, after having been counts and dukes of Savoy for 700 years in the aggregate, these princes were ranked among royal dynasties, allied with almost all the great houses of Europe, and finally the reigning king Victor Emanuel has become the ruler of all Italy. (See ITALY.) Except during the French domination under the republic and Napoleon I., Savoy remained a part of the Sardinian states till 1860, when by the treaty of Turin (March 24) it was ceded to France, together with most of the county of Nice, on condition that the inhabitants should approve of the transfer; and a large majority of affirmative votes having been cast at the election for that purpose, the county was formally annexed to France, June 12.

SAW, an instrument usually made of a steel plate with teeth along one edge, used for cutting wood, ivory, stone, and the softer metals. The ancient Egyptians used saws of bronze, and applied them to cutting out planks from logs. The saw was single-handed, and the log was placed on end and secured to posts set in the ground. The inventor of the saw was deified by the Greeks, and called by some Talus and by others Perdix. The saws of the Grecian carpenters were like the straight frame saws of modern times, the blade set across the middle of the frame, with the teeth perpendicular to its plane. The block of wood to be sawn was clamped down upon a bench, and the workmen stood on opposite sides of this, one at each end of the saw.—Saws are of various forms and sizes, according to their intended use. The older forms are straight strips of steel, either set in a frame, or simply provided with handles at each end, so as to be moved forward and back by two persons; or the plate is made stiff enough for a single handle to answer, when it is worked by one person holding it in one hand. In modern times saw blades are often circular, the teeth cutting as the saw revolves constantly in the same direction.—Steel plates intended for large saws are prepared from ingots carefully made to secure uniform quality, and after being rolled they are slit into the shapes for the different saws. The edge intended for the teeth is then ground true, and the teeth are cut by a punch at a fly press. The rough edges left by the punch are filed down and the teeth are sharpened. The blades are next heated in ovens to a red heat, and then immersed horizontally and edgewise into a trough containing oil with certain portions of melted tallow, beeswax, rosin, pitch, &c. To remove the excess of hardness they thus acquire, after wiping off a portion of the composition that adheres to them, the blades are held over a fire until that which remains ignites; this

is called "blazing off." The more that is removed of the composition before this burning, the harder is the blade; and thus its temper is regulated for the kind of saw required. To give it uniform density throughout, the blade is next hammered over its face upon an anvil or polished steel; this is called "planishing" or "smithing." The next process is grinding the surface, to reduce the thickness of the metal from the teeth toward the back edge. Small blades are held against the stone by means of a board laid upon them, and large saws are suspended at each end. The finishing processes are repetitions of the planishing and grinding, together with polishing by smooth stones and with emery.—The teeth are variously shaped for different saws. The most simple are made by angular notches, the angle at the apex of the notch being of 60°. This is most convenient for sharpening, as the common triangular or "three-square" file is just adapted to its figure. When the teeth are made with equal sides, they are said to have an upright pitch; and when they make a zigzag of alternating long and short lines, they are said to be flat or to have considerable pitch. The former are adapted for cross-cut saws, worked by two men, one at each end. Such teeth lack the chisel-like effect of those of a low pitch, and rather scrape away the wood than tear into it like the latter, which cut only when the saw is moved in the direction toward which the teeth point. Hand saws in the United States and England have the teeth pointed from the handle; in Asiatic countries and in Greece they have always been made with teeth pointed the other way. A straight cut upon a line can probably be made better by the thrusting cut, and in this the sawdust is thrown out more freely; but the force is certainly applied to better advantage as regards the saw in pulling it in the line of its greatest strength than in pushing; and for very slender saws, in which it is an object to dispense with all unnecessary width and thickness, as in the keyhole and other similar sorts, it would appear decidedly better to adopt the East Indian practice. Some large saws are notched at a sharper angle than 60°, and for these, special files made for the angle are used, and are known as mill-saw files. Teeth made at a low pitch in large saws would become clogged with sawdust unless the space between them were enlarged, and the various forms in which this is done give distinctive names to the teeth. In large mill saws and circular saws the space between the teeth, which may be 2 or 3 in., is hollowed out in a curve, and the outline is much like a fish hook in form, the shank of the hook bending back to make the back of one tooth, and the point curving round to form the under side or face of the next. All saws used for cutting wood require some provision against their liability to become jammed and the teeth clogged in the narrow passage they make for themselves. This is sometimes ef-

fectured by making the blade thinner toward the back, but the most effectual mode is in the "set" given to the teeth. In finishing the saw the last process is to bend half the teeth a little out on one side, and the other half on the other side. In eastern countries a group of a dozen teeth or thereabout are bent to one side, and the next group to the other. The operation is performed with a small hammer, the saw being held with the teeth resting on the rounded edge of a small anvil. The same may be done with the saw set, which is a bit of steel with slits suited to the different thicknesses of saw blades. The amount of set varies with the sort of service the saw is intended for. The more likely the material is to clog, the wider must be the spread of the teeth; but if it is an object to avoid the waste of the wood or the greater labor involved in a wide cut, the set should be as little as possible.—Circular saws were in use in 1790, and some forms have been employed for cutting the teeth of clock wheels ever since the time of Dr. Hooke. For cutting wood they were first brought into important service in the machines invented by M. I. Brunel for making ships' blocks, and adopted by the British admiralty board in Portsmouth in 1804. From that time they have continued in constant use and in various forms for different applications. Saws of this kind commonly run in a slit through a table, upon which the board or other material to be sawed is placed and pushed on against the descending teeth. They are made to revolve with great rapidity, and the teeth for those intended to work in soft wood and with the grain are made well apart and inclined and curved even to the fish-hook form. For harder wood the teeth are made smaller and more upright. Insertable teeth, now much used, are placed in notches in the periphery of the saw plate, and when worn down can be replaced. This contrivance is a great saving, and at the same time allows the dimensions of the saw to be preserved.—The oldest factory for large saws in the United States is probably that founded by William Rowland in Philadelphia in 1802. The largest saws in the world for sawing boards and plank are probably those made expressly for the California market, where they are wanted for the gigantic timber of that region. At the saw factory of Messrs. R. Hoe and co., in New York, circular saws are made of 80 in. diameter and a fourth of an inch thick, and mill and cross-cut saws 10 ft. long and upward. At this establishment are produced nearly all the varieties of saws in use, from circular saws of 4 in. diameter up, and from the common wood saw to the largest mill saws. Some of the articles are peculiar to the United States, as also the processes employed. The steel plates are almost entirely imported from England; some are received also from Philadelphia. Chain saws, made of solid links with serrated edges, the links being connected by rivets,

are in common use by surgeons for sawing bones when they are so situated that they cannot be operated upon with the common surgeon's saw. They are also sometimes used by mechanics under similar circumstances of position.—Band saws, made by serrating and setting the edge of a flexible steel band, are now largely used in shops for the working and carving of wood, making patterns, &c. They may be of almost any size, from that adapted to the sawing of scrolls in the thinnest boards to the sawing of lumber from logs, and they have the advantage of continuous motion in one direction. The band is moved by means of two rollers covered with leather or vulcanized caoutchouc, one of which is connected with the motor shafting.—The earliest notice of saws being run by power is contained in a manuscript of the 13th century in Paris, in which is a representation of the saw mill with a self action turned by a water wheel. Beckmann finds evidence of saw mills worked by water power in Augsburg, Germany, as far back as 1322. In the island of Madeira one is said to have been in operation in 1420, and the first one in Norway was built in 1530. In Holland they were in use more than 100 years sooner than in England; and the Dutch furnished the English with lumber. The operation of one at Lyons in 1555 is described by the bishop of Ely, then British ambassador at Rome. The first recorded attempt to establish a saw mill in Great Britain was made near London in 1663 by a Dutchman; but the enterprise was abandoned on account of the opposition of the hand sawyers. In 1700 the advantages offered by this improvement were set before the public by one Houghton; but no one ventured to introduce it till 1767 or 1768, when by the desire of the society of arts a saw mill was built at Limehouse by James Stansfield. It was soon destroyed by the mob. In the American colonies the importance of this expeditious means of obtaining sawed lumber was generally felt, and efforts were early made to obtain the necessary machinery, such as was used in Holland. In 1634 a saw mill was put in operation at the falls of the Piscataqua, between Berwick and the Cocheco branch of that river, and this is supposed to have been the first mill of the kind in New England. In New York as many as three mills were constructed by the Dutch West India company about 1633, to run by water power or by wind. One of them was on Nut or Governor's island, which was leased in 1639 for 500 merchantable boards yearly, half oak and half pine. Another was on Saw Mill creek, a small stream which flowed into the East river from the pond known as the Collect. On the Delaware saw mills were erected by the Dutch and Swedes before the arrival of Penn.

SAW FISH, a cartilaginous fish of the genus *pristis* (Lath.), the type of a family intermediate in position between the sharks and rays, though generally ranked with the latter. It

has the elongated and rounded form of a shark, with the mouth and gill openings on the ventral surface as in rays. Its distinguishing character is the long, flattened, narrow, and straight snout, set on the sides with teeth or strong bony spines, forming a double-edged saw-like weapon, whence the common name. The true jaw teeth are very small, and pavement-like as in the rays; the body is flattened in front of the pectorals, the posterior portion and the tail as in sharks; the skin is covered with small rough scales; the pectorals are distant from the head, and not extending to the ventrals; the tail has two dorsals, and a caudal fin prolonged as in the sharks. About half a dozen species are described, found in arctic, tropical, and antarctic seas, and one all along the coast from New England to Florida; they are rapid swimmers. The beak attains a length of from one fourth to one third the total length of the body; it is covered with a rough skin, and is narrower toward the end, which is rounded; this beak has been found driven deeply into the timbers of ships. They seem to have a natural antipathy to the larger cetaceans, and many voyagers have been witnesses to their victories over them. The jaw teeth are adapted for crushing crustaceans and similar animals upon which they feed, and not for tearing flesh. According to Owen, the beak is composed of the cartilages attached to the frontal, nasal, and vomerine bones blended into a horizontal flattened plate, which is more completely ossified than any other part of the skeleton; a series of deep sockets on each of the lateral margins contain the teeth, which are solid, the base being slightly concave and porous, and the spaces between them hollow and filled with a gelatinous medulla, rendering it light without diminishing its strength; vessels and nerves supply the teeth, which grow by constant addition of ossified pulp material at the base. Though the projections of the beak are implanted like teeth, they have no relation to the intestinal canal, and are turned outward like spines of the external or dermoskeleton; they form a very interesting transition between teeth and cutaneous spines. These teeth wound by repeated blows, and not by cutting like a saw; the Polynesians use this beak as a sword.—The common saw fish is the *P. antiquorum* (Lath.), which attains a length of 12 to 15 ft., of which the beak is about one third, with 20 to 30 teeth on each side; it is

Common Saw Fish (*Pristis antiquorum*).

blackish gray above, and lighter below; the eyes are large, the nostrils in front of the mouth protected by a membranous fold, and

two oval foramina behind the eyes. Klein says that in the embryo the sides of the snout are as smooth as the gums of a new-born infant; but according to Latham they grow very rapidly after birth, and are not shed and replaced like the teeth of mammalian jaws.

SAW FLY, the popular name of the *tenthredinidæ*, a very destructive family of hymenopterous insects. They are found on the leaves of plants, and live almost entirely on vegetable food; they are poor fliers and sluggish; the form is generally short and flattened, with broad head, and thorax widely joined to the abdomen, the antennæ short but of various forms, thread-like, knobbed at the end, feathered, notched, or forked; the wings overlap, cover the back, and are horizontal when closed. The females have two saws, lodged in a groove in the hind part of the body within two sheath-like pieces; they are placed side by side, with the ends directed backward, the form and the shape of the teeth varying; they usually curve upward, and are serrated along the lower or convex edges; each saw has a back to steady it, but the blade slides forward and backward on it; they are not only toothed on the edge

Elm Saw Fly (*Cimbex ulmi*).

but on the sides, acting as rasps as well as saws. With these they saw slits in stems, leaves, and fruits, in which their eggs are deposited; the wounds sometimes produce galls in which the young are hatched and grow. The larvæ look much like caterpillars, are cylindrical and greenish, with several pairs of legs, generally 18 to 22; most are naked, but some have a few prickles, others a white flaky substance, and a few a dark, slimy, slug-like skin. The larvæ also resemble caterpillars in habits; when fully grown they enter the ground and make a silken cocoon, but a few place their cocoons on plants or in crevices above ground; they remain thus during the winter, change to whitish chrysalids in spring, and soon come out winged insects; there are sometimes two broods, one going through all its changes during summer.—About 100 species are found in New England alone. The largest is the elm saw fly (*cimbex ulmi*, Peck), about $\frac{1}{2}$ in. long, with an expanse of wings of nearly 2 in.; the female resembles a hornet, with black head and thorax, hind body steel-blue with three or four yellowish spots on each

side, and smoky brown transparent wings. The male is very different, and is the *C. Americana* of Leach; the body is longer and narrower, without the spots on the sides. They appear from the last of May to the middle of June, the eggs being deposited on the American elm, whose leaves are eaten by the larvæ; these in August are nearly 2 in. long, thick-bodied, with 22 legs, rough skin, pale greenish yellow, with numerous transverse wrinkles and black dorsal stripe and spiracles; when at rest they lie on the side in a spiral, and eject a watery fluid from lateral pores when disturbed; they make a tough cocoon under dead leaves, in which they remain all winter, being transformed to chrysalids in spring. The fir saw fly (*lophyrus abietis*, Harris) is very destructive in the larva state to the fir family in New England. The male is about $\frac{1}{4}$ in. long and $\frac{2}{5}$ in. in expanse of wings; black above, brown below, the wings with changeable tints of reddish, green, and yellow; the legs dirty yellow; antennæ like short black feathers curled inward on each edge. The female is $\frac{3}{10}$ in. long and $\frac{1}{2}$ in. in expanse; yellowish brown above, with blackish stripe on each side of thorax; dirty yellow below; antennæ short



Fir Saw Fly (*Lophyrus abietis*).

and tapering, 19 jointed, serrated on the outside. They appear early in May, making slits for their eggs in the edges of the leaves; the larvæ come out in June and July, living in large swarms, curling the hind part of the body around the leaf while feeding, and throwing up the head and tail when disturbed; they are about $\frac{1}{2}$ in. long, the head and anterior parts black; body pale green with longitudinal stripes; below yellowish; they become almost yellow at last, and descend to the ground, where they make oblong grayish cocoons, $\frac{1}{10}$ in. long, escaping in the spring by a lid at one end. The most effective means of destroying them is showering the trees with soap suds or a solution of whale-oil soap. A nearly allied species, *L. pini* (Latr.), is very destructive to the pine and fir in Europe; the eggs are laid in slits in the leaves closed up by a viscid substance which issues from the mouth; whole forests in Germany have been stripped by the larvæ; among their enemies are insectivorous birds and mammals, like the woodpeckers, mice, and squirrels, and also ichneumon flies. The vine saw fly of the United States (*selandria vitis*, Harris) is black, with red thorax above, and fore legs and under sides of all the legs yellowish white; wings smoky; the

female $\frac{1}{4}$ in. long, the male smaller. They lay eggs in the spring on the lower side of the terminal leaves of the vine, the larvæ appearing in little swarms in July, feeding in company and eating the leaves even to the stalk; they are $\frac{1}{8}$ in. long when full grown, the head and tip of tail black, the body light green above with two rows of black dots on each ring, and yellowish below; they make cells of earth lined with silk, and come out perfect insects in about two weeks, when they lay eggs for a second brood, which eat, go into the ground for the winter, and come out flies the next spring. The best remedies are dusting air-slacked lime on the vines or showering them with strong soap suds. Another saw fly injurious to fruit trees will be noticed under SLUG WORM.



Vine Saw Fly
(*Selandria vitis*).

SAWYER. I. Thomas Jefferson, an American clergyman, born in Reading, Windsor co., Vt., Jan. 9, 1804. He graduated at Middlebury college in 1829, studied for the ministry, and in 1830 took charge of a Universalist society in New York. In 1845 he became the principal of the Clinton liberal institute, Oneida co., N. Y., and also taught classes in theology. In 1852 he resumed his former charge in New York, and soon afterward held a public debate with the Rev. Isaac Westcott, a Baptist clergyman, which was published under the title, "Discussion of the Doctrine of Universal Salvation" (12mo, 1854). He aided in founding the theological school at Canton, N. Y., and in the establishment of Tufts college at Medford, Mass., in which since 1869 he has been professor of theology. Harvard university conferred upon him the degree of D. D., and the Leipsic theological historical society has made him one of its members. **II. Caroline M. (Fisher)**, an American author, wife of the preceding, born in Newton, Mass., Dec. 8, 1812. Her contributions to the youth's department of the "Christian Messenger" have been collected in a series of volumes. She has edited the "Rose of Sharon," a Universalist annual, and the "Boston Repository," a Universalist monthly magazine, published many poems, and made numerous translations from the French and German.

SAXE, John Godfrey, an American author, born in Highgate, Franklin co., Vt., June 2, 1816. He graduated at Middlebury college in 1839, was admitted to the bar at St. Albans in 1843, and practised in his native county until March, 1850. From 1850 to 1856 he was editor and proprietor of the "Burlington Sentinel" newspaper, and in 1856 was state's attorney. In 1859 and 1860 he was the candidate of the democratic party of Vermont for governor. His published works include "Progress, a Satire" (New York, 1846); "New Rape of the Lock" (1847); "The Proud Miss McBride" (1848); "The Times" (1849); "The Money King and other Poems" (1859); "Clever Sto-

ries of Many Nations" (1864); "The Masquerade and other Poems" (1866); "Fables and Legends in Rhyme" (1872); complete "red-line" illustrated ed., 1874; and "Leisure Day Rhymes" (1875). Of the first collection of his poems (Boston, 1849) 40 editions have been issued. He now (1875) resides in Brooklyn, N. Y.

SAXE, Maurice, count de, a marshal of France, born in Germany in October, 1696, died at Chambord, Nov. 30, 1750. He was the natural son of Augustus the Strong, elector of Saxony and king of Poland, by the Swedish countess of Königsmark, and at 12 years of age served in the army of the allies commanded by Marlborough and Eugene. He was present at the sieges of Tournay and Mons, and before the age of 15 was placed by his father in command of a regiment of cavalry, with which he did good service at the siege of Stralsund. He fought under Eugene against the Turks in 1717-'18, went to Paris in 1720, and received from the duke of Orleans the commission of *maréchal-de-camp* with the command of a regiment, which he proceeded to discipline and manoeuvre according to a system of his own invention. For several years he studied mathematics and the art of war under Folard, and in 1726 proceeded to the north in the hope of being elected duke of Courland. The opposition of Russia and Poland compelled him to take refuge in France, notwithstanding he had secured his election. In 1728 he was recalled by the duchess, Anna Ivanovna, who had conceived an attachment for him, and with whom he might have shared the throne of Russia, to which in 1730 she was elevated, had not his inconstancy caused his dismissal. In 1733 he obtained a command in the French army, and for services at the siege of Philippsburg was appointed a lieutenant general. In the general war which broke out in 1740 he served with credit in the campaigns of Bohemia and on the Rhine, and in 1743 was appointed a marshal of France. In 1744, at the head of an army in Flanders, he held his ground against forces thrice as numerous as his own, retaining all the conquests previously made by the French; and in 1745 he was appointed general-in-chief of the forces in Flanders, amounting to 100,000 men. The campaign began with the siege of Tournay, and on the approach of the allies under the duke of Cumberland to the support of the town, Saxe gave them battle at Fontenoy (May 11, 1745), and after an obstinate contest gained a memorable victory, which led to the speedy conquest of nearly the whole of the Austrian Netherlands. On this occasion, though suffering so severely from an attack of dropsy as to be obliged to travel in a litter, he caused himself to be conveyed to all parts of the field. Louis XV. bestowed upon him the estates of Chambord, which yielded an annual revenue of 100,000 francs; and for the victory gained at Raucoux over the allies under Charles of Lor-

raine, Oct. 11, 1746, he was made marshal general of France. In the campaigns of 1747-'8 Saxe captured Lawfeld, Bergen-op-Zoom, and Maestricht, which with other successes led to the peace of Aix-la-Chapelle in 1748. He passed the rest of his life in princely style on his estate. Saxe was remarkable for his stature and bodily strength; he died prematurely from the effects of debauchery. He devoted several years to a work entitled *Mes rêveries* (5 vols. 4to, 1757), containing many useful hints on the art of war, which was translated into English by Sir William Fawcett (London, 1757). Numerous biographies of Saxe have been published, including one by Delabarre-Duparecq (Paris, 1850), and one by Karl von Weber (Dresden, 1863); and Carlyle has drawn a portrait of him in his "Life of Frederick the Great."

SAXE-ALTENBURG. See ALTENBURG.

SAXE-COBURG. See COBURG.

SAXE-COBURG-GOTHA, a duchy of the German empire, consisting of two principal parts separated from each other by Prussia and Meiningen. The northern division comprises the former duchy of Gotha, and is bounded by Prussia, Schwarzburg, Weimar, and Meiningen. The southern, comprising the duchy of Coburg, is bounded by Bavaria and Meiningen. Area, 760 sq. m.; pop. in 1871, 174,839, almost all Protestants. Both parts of the duchy are mountainous and have beautiful valleys and forests; the highest peaks of the Thuringian Forest are found in Gotha. The duchy is watered by the Gera, Nesse, Unstrut, and Ilm. Grain, flax, and timber are the chief products. In the mountainous parts of Gotha pitch, tar, and lampblack are made. There are manufactories of linen, woollen goods, cutlery, porcelain, and wooden toys, iron founderies, and beet-sugar refineries. The duchy has one vote in the federal council of Germany, and sends two deputies to the German Reichstag. The local diet or legislature consists of one chamber with 21 members, who are chosen by the special diets of the two duchies, Gotha choosing 14 and Coburg 7. The present duke, Ernest II. (born June 21, 1818), succeeded his father in 1844; as he has no children, the heir presumptive to the throne is his nephew Alfred, duke of Edinburgh, second son of the duke's brother Prince Albert and Queen Victoria of Great Britain. The ducal line of Gotha, which was founded in 1681, by Frederick, eldest son of Ernest the Pious of Altenburg and Gotha, became extinct in 1825. After protracted negotiations between the other Saxon houses, Gotha was given to the ducal line of Coburg-Saalfeld, which had been founded by a younger son of Ernest the Pious. The duke of Coburg-Saalfeld in turn ceded Saalfeld to the duke of Meiningen, and assumed the title of Saxe-Coburg-Gotha.

SAXE-LAUBURG. See LAUBURG.

SAXE-MEININGEN-HILDBURGHAUSEN, a duchy of the German empire, composed of the old duchy of Meiningen, the principalities of Hild-

burghausen and Saalfeld, and some smaller districts, bounded mainly by Prussia, Bavaria, Coburg, and Weimar; area, 953 sq. m.; pop. in 1871, 187,957, nearly all Protestants. Its surface is mountainous, several peaks of the Thuringian range rising to an elevation of nearly 3,000 ft. The Werra traverses the duchy, first W. and then N. W.; the other principal rivers are the Saale and Ilm. There are salt and mineral springs. The valleys are fertile. The manufactures consist principally of coarse cotton and linens, iron ware, pottery, and glass. The reigning duke George (born April 2, 1826) succeeded his father in 1866. The government is limited by a diet of a single chamber with 24 members. It has one vote in the federal council, and sends two deputies to the Reichstag. The principal towns are Meiningen, the capital, on the Werra, Saalfeld, Hildburghausen, Sonneberg, and Eisfeld.

SAXE-WEIMAR-EISENACH, a grand duchy of the German empire, composed of the principalities of Weimar and Eisenach, which are separated by Prussian Saxony and Coburg-Gotha, and of the district of Neustadt, separated from Weimar by Altenburg, and 12 smaller portions; area, 1,404 sq. m.; pop. in 1871, 286,183, of whom 9,404 were Roman Catholics, 1,120 Jews, and the rest Protestants. It has a diversified surface, being broken by branches of the Thuringian Forest and the Hohe Rhön, and is watered by the Saale, Ilm, Gera, Werra, Nesse, and Ulster. A large portion of the soil is adapted to agriculture, and produces grain, flax, and hemp; but the principal staple is wool. The reigning grand duke is Charles Alexander (born June 24, 1818), who succeeded his father in 1853. It has one vote in the federal council, and sends three deputies to the Reichstag. The local legislature or diet consists of one chamber with 31 members. The chief towns are Weimar, the capital, Jena, Apolda, Neustadt, and Weida.

SAXIFRAGE (Lat. *saxifraga*, from *saxum*, a rock, and *frangere*, to break), a plant, many species of which grow in the crevices of rocks, and were once supposed to disintegrate them; hence, according to the doctrine of signatures, the plants at one time were regarded as able to break up and remove stone in the bladder. The genus *saxifraga* gives its name to a family, the *saxifragaceæ*, which with the additions made by recent revisions is very large; it may be briefly described as very near *rosaceæ*, but generally without stipules, and with albuminous seeds. *Saxifraga* comprises about 160 species, found in temperate and arctic regions, and especially in alpine situations; nearly all are perennials, often with their radical leaves in a cluster; the usually small perfect flowers in a panicle or corymb, with a five-cleft calyx, five petals, and ten stamens; ovary of two more or less united carpels, with two styles, and frequently cohering with the calyx, ripening into two many-seeded follicles. The early or Virginian saxifrage (*S. Virginensis*) is in

all the northern states one of the earliest and most abundant of spring flowers, especially on dry hills and growing in the clefts of rocks with a warm exposure; it has a tuft of thickish obovate leaves, tapering into a broad petiole, and scollop-toothed on the margin; from the centre of the cluster rises a flower stem 4 to 8 in. or more high, at the top of which is a dense clustered cyme, which later becomes an open loose panicle; the difference in appearance between the plant when it begins to flower and later in the season has caused it to be described under several different names; the flowers are white, sometimes tipped with purple, and occasional specimens have double flowers. This species extends from Canada to the mountains of Georgia and west to Oregon, blooming from April to June. Some few alpine species are found only on Mt. Washington and other northern peaks.

The swamp saxifrage (*S. Pennsylvanica*) is a coarse species found in wet places, with flower stalks 1 to 2 ft. high, but without beauty; and several others are found in the eastern states. In the arctic and subarctic portions of the continent there are several interesting species, and some are peculiar to the Rocky mountains and other western ranges.—In England the climate allows of the cultivation of a large number of alpine species, which will not grow here on account of our hot summers. The most common in American gardens are the thick-leaved saxifrage (*S. crassifolia*) from Siberia, and several similar species, with fleshy, nearly evergreen leaves, 6 to 7 in. long; in very early spring they throw up a thick stalk, about a foot high, with a large cluster of bright rose-colored flowers, which is compact at first, but spreads later into an ample cyme; they bloom so early that they are apt to be caught by late frosts. *Saxifraga umbrosa* is a favorite plant



Early Saxifrage (*Saxifraga Virginensis*).



Thick leaved Saxifrage (*Saxifraga crassifolia*).

in English gardens. (See LONDON PRIDE.) The umbrella saxifrage (*S. peltata*) of California is remarkable for its large leaves, and is somewhat cultivated for its striking foliage. A species which multiplies by means of long runners (*S. sarmentosa*), introduced from China, is cultivated as a house plant, in window baskets, and in greenhouses, under the names of beefsteak and strawberry geranium, wandering Jew, mother of thousands, sailor plant, and various others; it has round-heart-shaped or kidney-shaped, hairy leaves, purplish below and mottled above with green and white; it forms thread-like runners, a foot or more long, at the end of which a bud and ultimately a new plant appears, which if it reaches the earth will take root, and if not will throw out other runners. The old plants throw up a stem which bears a panicle of irregular flowers, with two long hanging white petals, and three erect smaller ones, spotted with pink and yellow.

SAXO, surnamed GRAMMATICUS, a Danish historian, died about 1204. According to the common opinion he was provost of the cathedral of Røskilde, then the Danish capital, and was employed by Archbishop Absalon to write a history of Denmark. For times near his own, Saxo is an unexceptionable witness; but in describing remote periods he drew from popular tradition. His *Historia Regum Heroumque Danorum* was first printed in Paris (fol., 1514). A learned commentary on it has been written by Stephens (fol., Sorø, 1644).

SAXONS, a name first used by the geographer Ptolemy to indicate a branch of the Germanic race, now dominant in the northwestern lowlands of Germany, especially in the region of the middle and lower Elbe, between the Hartz and the northern slopes of the Thuringian Forest, and between the Weser and the Rhine. The Saxons mentioned by Ptolemy were a small tribe, who in his time (2d century A. D.) dwelt between the Eider, Trave, and Elbe, and upon several of the adjacent islands. The word Saxon is supposed by some to have been derived from *Sakaisuna*, sons of the Sakai, or Scythians, and by others from *sahs*, a flint knife or short sword. Eutropius, the next after Ptolemy who mentions them, says that the Saxons, united with the Franks, had become formidable against the Roman frontier. The exploits of the Saxons were chiefly at sea. A special Roman fleet was appointed to act against them, and the southern coast of Britain was placed under an officer styled *comes littoris Saxonici*. Carausius, a Belgian, who usurped the purple in A. D. 287, gave them ships, sent officers to teach them the science of navigation, and encouraged their depredations upon every coast which had not acknowledged his authority. Magnentius, who had seized Italy and Gaul, and assassinated the emperor Constans, likewise formed an alliance with them in 350; other tribes joined their standard; and at length they gave their name

to a powerful league rivalling that of the Franks, and embracing all the tribes between the Skager Rack and the limits of modern France, extending inland to the Saale, and beyond to the western frontier of Bohemia. In the middle of the 5th century Saxon tribes took possession of the coast land of modern Normandy as Roman allies and mercenaries, and others settled on the banks of the mouth of the Loire; but both hordes soon disappeared in the subsequent Frankish empire. In the 5th and 6th centuries they established themselves in Britain (see ANGLO-SAXONS) and on the continent, fought with the Thuringians, attacked the upper Rhine, and extended the scene of their spoils far inland. Charlemagne at last, after one of the most obstinate and destructive wars recorded in history (772-804), destroyed their aggressive power, and forced them to accept Christianity. (See CHARLES I. of Germany, vol. iv., p. 290.) Among the principal Saxon tribes were then reckoned the Westphalians, Eastphalians, Ditmarsians, and Holsatians. In the middle of the 9th century arose the duchy of Saxony, to which Thuringia was soon after annexed. Henry the Fowler, duke of Saxony, became king of Germany (919), and his son Otto I. gave the duchy to Hermann Billung, whose house ruled it for a century and a half. Mainly under it were founded the margraviates of Meissen, East Saxony, and others, in territories wrested from the Slavs and Danes. After the death of the last emperor of the house of Henry the Fowler, Henry II. (1024), the Saxon dukes often struggled against the emperors of the houses of Franconia and Swabia. Lothaire, of the Supplinburg family, becoming emperor in 1125, gave Saxony to Henry the Haughty of Bavaria, under whose son Henry the Lion the duchy was broken up. (See HENRY THE LION.)—Only a very small number of monuments of the Old Saxon language, properly so called, are extant. The most important and largest is the *Heliand* (the Saviour), of the 9th century, which gives in alliterated verses the gospel narrative of the life of Christ. Two manuscripts of it are in existence, one in Munich and the other in the British museum. It appears to be but a portion of an extensive work giving a versified paraphrase of the Old and New Testaments, made at the request of Louis le Débonnaire. The first edition of it, by Schmeller, appeared in 1830-'40. (See GERMANIC RACES AND LANGUAGES, and ANGLO-SAXONS, LANGUAGE AND LITERATURE OF THE.)

SAXONY (Ger. *Sachsen*), a kingdom of the German empire, between lat. 50° 10' and 51° 30' N., and lon. 11° 55' and 15° 5' E., bounded N. and N. E. by Prussia, S. E. and S. by Bohemia, S. W. by Bavaria, and W. by the Thuringian states and Prussia; area, 5,788 sq. m.; pop. in 1871, 2,556,244. Capital, Dresden. The southern part is traversed by spurs of the Fichtelgebirge and the Erzgebirge, the latter separating the country from Bohemia. The picturesque region where the spurs approach the

Elbe is called Saxon Switzerland. The Lusatian mountains on the right bank of that river connect the Erzgebirge with the Riesengebirge. The S. W. portion of the country is known as the Voigtland. About three fifths of the surface is level or slightly undulating. The principal rivers are the Elbe and its tributaries the Elster, Mulde, and Spree. The climate is salubrious, but severe in the mountains. Grain, fruit, and flax are produced in large quantities. Of the total area, 52·4 per cent. is under tillage, 13 per cent. meadows and pastures, 30·5 per cent. forests, and only 4·1 per cent. unproductive. Cattle are raised in great numbers. Saxony has long been celebrated for its fine wool; recently the sheep have declined in number, but improved in breed. The value of all private landed property rose from \$294,000,000 in 1830 to \$490,000,000 in 1858, and \$807,000,000 in 1874. Minerals abound, including coal, silver, iron, lead, tin, marble, porcelain clay, arsenic, &c. The amount of silver mined in 1870 was 64,000 lbs.; iron, 179,000 quintals; lead, 70,000 quintals. Nearly 30,000 persons are employed in mines and smelting. In 1871 there were 681 distilleries and 699 breweries, producing 40,800,000 gallons of beer. More than half the population is engaged in manufactures, producing fine linen, silk, and woollen goods, laces and embroideries, tin spoons, paints, straw goods, porcelain, musical instruments, iron and tin ware, machinery, and many other articles. The book trade and the fairs of Leipzig and the general commerce of Saxony are of great magnitude. (See GERMANY, and LEIPZIG.) Public education is as well provided for in Saxony as in Prussia. The university of Leipzig enjoys world-wide celebrity, and there are various academies in Dresden, a celebrated one for mining at Freiberg, and many gymnasiums and normal and special schools, besides the numerous common schools. The kingdom is divided into the districts of Dresden, Leipzig, Zwickau, and Bautzen (including the main part of Upper Lusatia).—Since 1831 Saxony has been a hereditary constitutional monarchy. The constitutional and electoral laws were perfected in 1849, 1851, 1860, 1861, and 1868. The king is a Roman Catholic, but 98 per cent. of the people are Protestants, of German race. In 1871 there were 3,357 Jews, and about 50,000 Wends, of Slavic race, almost all in Lusatia. Saxony holds the third rank in the federal council of Germany, having four votes, and is represented by 23 deputies in the Reichstag. The legislature consists of an upper chamber composed of royal princes, nobles, prelates, large landed proprietors, and the burgomasters of the eight chief towns (Dresden, Leipzig, Chemnitz, Zwickau, Plauen, Glauchau, Freiberg, and Meerane); and of a second chamber with 35 representatives of towns and 45 of rural boroughs. The executive government is exercised under the king by a council of state and six heads of departments constituting the minis-

try. The Saxon troops form the 12th corps of the German army. The only fortress of Saxony is the impregnable castle of Königstein, the commander of which is appointed by the emperor of Germany. (See KÖNIGSTEIN.) The public debt at the close of 1873 was about \$81,000,000. The revenue and expenditures were respectively estimated for 1874-'5 at \$11,000,000.—The Germanic Hermunduri are considered the original inhabitants of Saxony; they were followed by the Slavic Sorabs, who during the 9th and 10th centuries were overpowered by the Saxons. The latter founded the margraviate of Meissen (Misnia), which in the 12th century, under the house of Wettin, became one of the most flourishing states of Germany. A long intestine conflict was terminated in 1308 by the recognition of the margrave Frederick the Bitten as joint ruler of Meissen and Thuringia. A portion of Franconia was subsequently added, and in reward for services in the Hussite war, the house of Wettin in 1423 obtained the electoral dignity, which had been borne by Saxe-Wittenberg, one of the fragments of the old Saxon duchy (see SAXONS), under a branch of the Ascanian family. On the death of Frederick the Warlike, the first elector (1428), his sons divided his possessions, which, reunited for a time, were again divided by his grandsons (1485). Ernest received the western portions, including Wittenberg and Thuringia, with the electoral dignity, and Albert the eastern, embracing the main parts of the present Saxony, founding respectively the Ernestine and Albertine lines. Frederick the Wise (1486-1525) and John the Constant (1525-'32), sons of Ernest, were strong protectors of Luther. John Frederick, son of John the Constant, while defending Protestantism as one of the leaders of the Smalcald league, succumbed in the battle of Mühlberg (1547) to an alliance between his cousin Maurice, of the Albertine line, and the emperor Charles V. Maurice succeeded to the electorate, which remained attached to his dynasty, and obtained the larger part of the Ernestine possessions, the remainder of which, subsequently enlarged by cessions, was gradually split up into the various Thuringian states. The elector John George I. (1611-'56), by his vacillating course during the thirty years' war, plunged Saxony into inextricable difficulties. Augustus (Frederick) I. the Strong (1694-1733) became a Roman Catholic to qualify himself for the throne of Poland (as such Augustus II.). His warfare with Charles XII. caused Saxony to be invaded by the Swedes. The disreputable reign of his son Augustus (Frederick) II. of Saxony and III. of Poland (1733-'63), and the wars with Prussia, especially the seven years' war, entailed still greater disasters upon the country. A better era began under the regency of Prince Xavier (1763-'8), during the minority of Frederick Augustus III. (as elector, 1763-1806; I. as king, 1806-'27), and during the reign of the latter, who was sur-

named the Just. He declined the crown of Poland and refused to join the coalition against the French revolution, but after the declaration of war against France he furnished his contingent as a member of the German empire. In 1805 he remained neutral, but in 1806 joined Prussia against France, which resulted in Saxony being conquered by Napoleon, who transformed the country into a kingdom, to which he added in 1807 the duchy of Warsaw. He was a loyal vassal of Napoleon in the wars of 1809-'13. After the battle of Leipsic he was detained by the emperor Alexander as a prisoner of war, but allowed to reside at Presburg during the debates of the congress of Vienna, which restored to him half of his German possessions, the other half being given to Prussia and the duchy of Warsaw to Russia. Anthony (1827-'36), a brother of Frederick Augustus, in 1831 adopted a constitutional form of government, and shortly after joined the Zollverein. The reign of King Frederick Augustus II., a nephew of Anthony (1836-'54), was disturbed by religious animosities, which in 1845 culminated in a bloody riot at Leipsic, by the revolution of 1848, and by a sanguinary struggle of the democratic party for the recognition of the national constitution of Germany (May, 1849). He died without issue, Aug. 9, 1854, and was succeeded by his brother John, the translator of Dante. As he sided with Austria in the war of 1866, the Prussians invaded his country on June 16, while his army withdrew to Bohemia and took part in the battle of Sadowa. Prussia made peace with Saxony, Oct. 21, on receiving a large indemnity and the right of garrisoning the fortress of Königstein, and Beust, as the principal instigator of the war, was obliged to leave the Saxon for the Austrian service. In the same year Saxony joined the North German confederation; and in 1871 it was incorporated in the German empire, after taking a distinguished part in the Franco-German war under the crown prince Albert, who succeeded to the throne on the death of King John, Oct. 29, 1873. (See ALBERT, FRIEDRICH AUGUST.)

SAXONY, a central province of Prussia, bordering on the provinces of Brandenburg, Hesse-Nassau, and Hanover, Anhalt, the kingdom of Saxony, the Thuringian states, and Brunswick; area, 9,746 sq. m.; pop. in 1871, 2,103,174. It is generally flat, but it has the Hartz mountains in the west (with their highest peak, the Brocken), and the Thuringian Forest in the south. The principal rivers are the Elbe, in the east, and its tributaries the Saale, Mulde, Unstrut, Bode, and Havel. The soil is fertile and the best cultivated in Prussia. Cotton and woollen cloth, leather, linen, sugar, tobacco, and beer are manufactured. The congress of Vienna in 1815 transferred most of this province from the kingdom of Saxony to Prussia. It is divided into the districts of Magdeburg, Merseburg, and Erfurt. Capital, Magdeburg.

SAXTON, Joseph, an American inventor, born at Huntingdon, Pa., March 22, 1799, died in Washington, D. C., Oct. 26, 1873. In his youth he constructed a printing press and issued a small newspaper. At the age of 18 he went to Philadelphia, where he found employment with a watchmaker and afterward with an engraver. His first invention was a machine for cutting the teeth of chronometer wheels. Afterward he constructed the astronomical clock with compensating pendulum, now in the state house. In 1831-'7 he was in England, where he constructed a compound magnet which sustained a weight of 525 lbs.; a magnetic needle several feet in length with a mirror on its end, which exhibited for the first time by the movement of a reflected beam of light the daily and hourly variations of the magnetic force of the earth; the magneto-electric machine; the locomotive differential pulley; an apparatus for measuring the velocity of vessels; and a metal-ruling machine. On his return to Philadelphia he became connected with the mint, and constructed the large standard balances in use in all the United States mints and assay offices. In 1848 he removed to Washington, where he superintended the construction of standard balances, weights, and measures, and of different portions of the apparatus used in the operations of the coast survey, and invented an automatic instrument for recording the height of the tides.

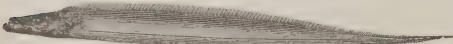
SAY, Jean Baptiste, a French political economist, born in Lyons, Jan. 5, 1767, died in Paris, Nov. 16, 1832. After being engaged in commercial pursuits, he became connected with the *Courrier de Provence*, a newspaper edited by Mirabeau in Paris, and afterward was the secretary of Clavière, the Girondist minister of finance. In 1794, in conjunction with Chamfort, Andrieux, and Ginguené, he founded *La décade philosophique, littéraire et politique*; and after the 18th Brumaire he was appointed a member of the tribunate. Forced by Bonaparte to withdraw from political life, he established a cotton-spinning mill, but was obliged to abandon it in 1812. After the fall of Napoleon he published an improved edition of his *Traité de l'économie politique* (1st ed., 2 vols. 8vo, 1803), to which he added an *Épilogue des principes fondamentaux de l'économie politique*. In 1815 he prepared a *Catéchisme d'économie politique*. In 1821 he was appointed professor of industrial economy in the *conservatoire des arts et métiers*, and in 1830 of political economy in the *collège de France*. His lectures were published under the title of *Cours complet d'économie politique et pratique* (6 vols. 8vo, 1828-'30; new ed., with notes by his son, 2 vols. 8vo, 1852). He also wrote *Lettres à M. Malthus sur différents sujets d'économie politique* (1820), reprinted under the title of *Mélanges et correspondances d'économie politique* (1833), and various essays which have been collected in his *Œuvres diverses*. His *Traité* and *Catéchisme* have each

been twice translated into English.—His son HORACE ÉMILE (1794–1860) and his grandson LÉON (born 1826) also hold a prominent place among political economists. The latter is now (1875) minister of finance.

SAY, Thomas, an American naturalist, born in Philadelphia, July 27, 1787, died at New Harmony, Ind., Oct. 10, 1834. In 1815 he investigated the natural history of E. Florida; in 1818 he explored the islands and coast of Georgia; in 1819 he was appointed chief zoologist in Long's expedition to the Rocky mountains; and in 1823 he accompanied that to St. Peter's river in the same capacity. He removed to New Harmony in 1825. His complete writings on entomology were edited by Dr. J. L. Le Conte, with a memoir by George Ord (New York, 1859), and his work on conchology by W. G. Birney (New York, 1858).

SAYCE, Archibald Henry. See supplement.

SCABBARF FISH, a fish generally placed with the mackerel family, and in the genus *lepidopus* (Cuv.). The only species described is the *L. argyreus* (Cuv. and Val.), inhabiting the European seas, and met with even as far south as the cape of Good Hope. The body is very elongated, compressed, and ribbon-shaped, and without scales; the head is pointed; the dorsal, anal, and caudal fins are distinct from each other, the first extending the whole length of the body; the jaw teeth are in a single row, those on the palate and pharyngeal bones and branchial arches very small; six branchiostegal rays, a long cæcal stomach, numerous pancreaticæ caeca, and a narrow air bladder. In a specimen taken on the coast of England, between 5 and 6 ft. long, the body was only 4½ in. deep at the gills, 2 in. at the beginning of the anal and at the tail, with a weight of 6 lbs. without the intestines; the pectorals were rather small, and the ventrals a mere squamous appendage, the styloid pubic bone being felt through the skin. Though not uncommon in European seas, this fish was not known to naturalists until the end of the 18th century; it was described by Montagu as *xiphothea tetradens*. According to Risso, its flesh is eaten in Mediterranean ports, and is firm and delicate. It swims with great velocity, waving like a long and wide ribbon of silver.—The silvery hair-tail (*trichiurus lepturus*, Linn.; *T. argenteus*, Mitch.) differs from the preceding genus in having no vestige of ventrals, in the anal



Silvery Hair-Tail (*Trichiurus lepturus*).

being a series of spines scarcely protruding through the skin, and in the tail ending in a filiform point without a caudal fin, whence the name; it attains a length of 4 ft. It is found on the American coast from New England to South America. The whole armature of the jaws indicates carnivorous habits. Other spe-

cies are described in the Indian ocean. Both of these genera are occasionally called ribbon fish.

SCÆVOLA, the cognomen of several Romans. **I. Caius Mucius**, a legendary hero, who flourished at the close of the 6th century B. C. Porsena of Clusium, the protector of the expelled Tarquins, having besieged Rome and reduced the city to great distress, Mucius went to the hostile camp, where, mistaking the chief secretary for the monarch, he struck him a fatal blow. On being dragged before Porsena, he declared that his purpose was to assassinate the king, a deed which other Romans would still achieve; whereupon Porsena ordered him to be burned alive, unless he betrayed his fellow conspirators. Mucius, to show how little the threat affected him, thrust his right hand into a fire, and held it there while it was being consumed. Porsena, astonished at his fortitude, commanded him to be liberated; and Mucius informed him that 300 Roman youths had sworn to free Rome from so dangerous an enemy, or to perish in the attempt. Porsena thereupon made peace with the Romans; and Mucius, in consequence of the loss of his right hand, was ever after distinguished by the cognomen of Scævola, or the left-handed.

II. Quintus Mucius, called the augur, tribune of the people in 128 B. C., plebeian ædile in 125, prætor in 121, and consul with L. Cæcilius Metellus in 117. He was distinguished for his legal erudition and his modesty. He died soon after the outbreak of the civil war between Marius and Sulla. Cicero in his youth was a pupil of this Mucius, whom he makes an interlocutor in several of his dialogues. **III. Quintus Mucius**, the pontifex, was tribune of the people in 106 B. C., curule ædile in 104, consul with L. Licinius Crassus in 95, and afterward pontifex maximus. After his consulship he obtained the province of Asia, where a festival was instituted in commemoration of his virtues. He fell a victim to the Marian faction in 82, and was slain in the temple of Vesta. He was still more celebrated as a lawyer than his contemporary and namesake. He was the first to compose a scientific treatise on the *Jus Civile*, now lost; and he wrote also *Περὶ Ὁραν*, a work on legal definitions.

SCALA (Lat. SCALIGERI), an Italian family whose power in Verona was established in 1260 by Mastino I. della Scala, who was assassinated in 1279, and whose most celebrated successor was Cangrande, the friend of Dante. (See CANE I. DELLA SCALA.) After receiving in fief from the emperor Henry VII. Verona, which they greatly embellished, and other important cities, their power was extended under Cangrande's successors, the joint rulers Alberto II. and Mastino II., as far as Lucca; but they became involved in war with Venice and Florence. The power of the Scalas greatly declined after Mastino's death in 1351, and still more under Cangrande II. and other worthless rulers, and it was finally overthrown in 1387 by Giovanni Galeazzo Visconti.

SCALD. See BURNS AND SCALDS.

SCALE (Lat. *scala*, a ladder), a graduated line or slip of wood, ivory, metal, or paper, divided into parts equal or unequal, and used for transferring these parts by dividers in plotting. The most simple scale is that of equal parts, and this may serve not merely for giving proportional linear spaces, but also for laying down angles with greater accuracy, the table of chords being referred to to give the proportional length of the chord of any angle to the radius of the circle. The common six-inch ivory scale contains several scales, each of which presents a different division of the inch, as into quarters, and one of these into tenths, and each tenth by what is known as the diagonal scale into 10 parts; other divisions are into 3, $3\frac{1}{2}$, 4, $4\frac{1}{2}$, 5, and 6 equal parts, one of each of these being divided into tenths, and one of each of the principal divisions into twelfths. These scales are also sometimes furnished with trigonometrical lines, as scales of chords, rhumbs, sines, secants, and tangents. (See GUNTER, and SECTOR.) Scales of equal parts have of late been produced in a very convenient and cheap form upon paper, the divisions being of 12 inches, and a 18th inch which is divided into 20, 40, 50, and 60 equal parts. Other scales give different divisions.

SCALE, Musical. See MUSIC.

SCALES (of fishes). See COMPARATIVE ANATOMY.

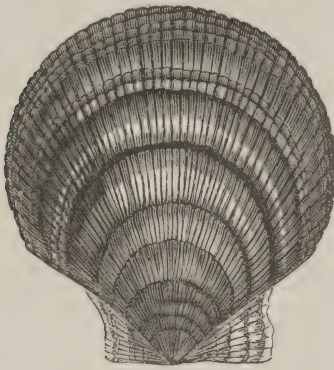
SCALES. See WEIGHING MACHINES.

SCALIGER. I. **Julius Cæsar**, an Italian philologist, born, according to his own account, at Riva, on the lake of Garda, April 23, 1484, died in Agen, France, Oct. 21, 1558. He claimed descent from the Scaligeri (or family della Scala), sovereign princes of Verona from 1260 to 1387, and asserted that he began his classical and medical studies when he was between 30 and 40 years old. This story has been disproved by Scipio Maffei and Tiraboschi. The latter says he was the son of an illuminator of Venice, a native of Padua, named Benedetto Bordone, who assumed the name of Della Scala, and that the son studied at Padua in his youth. In 1525 Scaliger went to Agen as physician to the bishop of that city, and married into a noble family. His extraordinary fame as a scholar drew to Agen crowds of literary men. His vanity, however, was equal to his learning, and one of his first publications was a virulent attack upon Erasmus. He wrote Latin poetry and many commentaries on the classics, and translated Aristotle's "History of Animals" and other Greek works into Latin. His chief productions are: *De Causis Lingue Latine* (4to, Lyons, 1540), the first considerable modern treatise on Latin grammar, and *Poetices Libri VII.* (fol., Lyons, 1561). II. **Joseph Justus**, the 10th son of the preceding, born in Agen, Aug. 4, 1540, died in Leyden, Jan. 21, 1609. He studied Latin at Bordeaux and under his father, and Greek under Turnebus in Paris, and learned the prin-

pal oriental and European languages. He embraced the reformed religion in 1562, became tutor in the family of Louis de la Roche-posay, and travelled extensively. In 1578 he was teaching philosophy at Geneva, but soon afterward retired to the residence of his patron near Tours. In 1593 he succeeded Justus Lipsius as professor of belles-lettres at the university of Leyden. He was as vain and arrogant as his father, whom he surpassed in erudition, and his latter years were embittered by a controversy with Scioppius and others on the pretensions of his family, which he had revived. He was never married. His most valuable works were those on chronology, *Opus de Emendatione Temporum* (fol., Paris, 1583), and *Thesaurus Temporum* (Geneva, 1609). Two collections of his fragments and conversations were published after his death, under the titles of *Scaligerana Prima* and *Scaligerana Secunda*. A sketch of his life and literary activity has been published by Bernays (Berlin, 1855).

SCALLOP, a bivalve of the genus *pecten* (Turton), having the shell rounded, inequivalve, eared, with the upper margin straight and the hinge without teeth. The lobes of the mantle are widely separated, and include a glandular sac containing a gaseous fluid which enables the light shell to float easily and to change position with the tide; the mantle is reflected in a sub-marginal fold provided with tentacles, with numerous ocelli or eye spots near the margin. The mouth is jawless and toothless, with a tentacular labial border, the tentacles being short and separate from the branchiæ; they have only one adductor muscle; the foot is long and cylindrical; the branchiæ are disunited on the median line. They rest on the right side; some of the family attach themselves by a byssus, especially when young, but most are free, living on the bottom of the sea at moderate depths, moving by means of the hatchet-shaped foot and the recoil produced by suddenly opening and shutting the valves. In the common scallop (*P. concentricus*, Say) the shell is orbicular, the valves convex and nearly closed, with about 20 rounded ribs; it is dusky horn-colored, with alternating lighter and darker zones; the interior is shining white tinged with purplish, and grooved to correspond to the external ribs; the length and height are about $2\frac{1}{2}$ in., and the breadth 1 in. It is abundant about the extremity of Cape Cod, whence it extends southward, being very common on the New Jersey coast; it varies considerably in color, with different degrees of whitish, reddish, and purplish; it is often handsomely zoned, and was formerly much employed for making card racks, pin cushions, &c. The muscle of the shell forms a delicate article of food. The *P. Islandicus* (Chemn.) is another American species, larger, handsomer, redder, with more numerous ribs, and living more to the north; it is found on the banks of Newfoundland, where it is a favorite food of many fishes, especially the cod. Some of the

foreign species are very handsome, as the *P. pallium* (Lam.), or the duke's mantle, finely mottled with deep red; this is from the In-



Scallop (*Pecten Islandicus*).

dian seas. The more northern *P. Japonicus* (Gmel.) is also a beautiful reddish shell, though it varies much. A large species, *P. maximus* (Lam.), is common on the English coast in from 30 to 40 fathoms; the deeper shell was formerly used for scalloping oysters, giving the name to this favorite dish, and as a drinking cup. The scallop of St. James (*P. Jacobæus*, Lam.) is common in the Mediterranean, and was worn by pilgrims to the Holy Land.

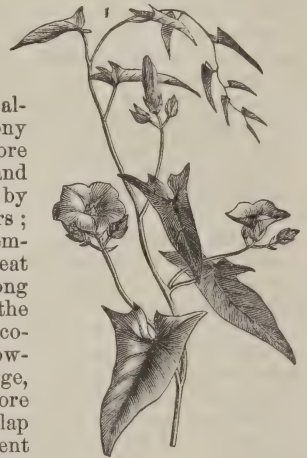
SCALY ANT-EATER. See PANGOLIN.

SCAMANDER, a small river of Troas, celebrated by Homer, who says that the gods called it Xanthus, and men Scamander. It probably owed the former name to the yellow or brownish color of its water, which was believed to have the power of tinging the wool of sheep which drank of it. (See TROY.)

SCAMMONY (Gr. *σκαμμόνιον*), a medicinal drug, the concrete juice of *convolvulus scammonia*. This is a perennial species with a woody root, which in old plants is 2 or 3 ft. long and 3 or 4 in. thick; its stems are numerous, twining, and woody at base, furnished with arrow-shaped leaves, and bearing long peduncles, each of which produces several pale yellow flowers about an inch long and striped with purple. It is found in Asia Minor, Syria, and the neighboring countries, Smyrna and Aleppo being the principal places of export. In collecting scammony, an excavation is made to expose the root for 4 or 5 in.; the top of the root, or crown, with its attached stems, is removed by a slanting cut, and at the lower edge of this slope a mussel or other shell is stuck into the root to receive the juice; at the end of about 12 hours the flow ceases, the shells are collected, and at the same time the cut surface of the root is scraped to remove any of the partially dried juice that may remain. The products attained by these methods are mixed and dried. The purest form of scammony is that which is allowed to dry in the shells, but this is only to be seen in cab-

inets of materia medica; the mixed product from the shells and scrapings is nearly as good, and even in this state it is very rare. Scarcely any article of medicine is more persistently adulterated than scammony; the work begins with the peasants who collect it, and much of it is made over a third time before it enters commerce. Chalk, ashes, sand, and wheat flour and other farinaceous articles are added; and what is known as Montpellier scammony is made up of different resins and starchy substances, and contains no scammony. Pure scammony is in irregular resinous lumps, of which 88 to 90 per cent. is soluble in ether; but it is more commonly met with in the form of round flattened cakes and more or less impure, though called virgin scammony. It has a peculiar cheesy odor, especially in powder; the amount and kind of foreign material mixed with it is readily ascertained by the use of solvents and a microscope. The dried root has been sent to

Europe, where the resin has been prepared by exhausting the root with alcohol. Scammony was used before the present era, and was mentioned by the early writers; and though not employed to any great extent, it has long had a place in the various pharmacopœias. It is a powerful drastic purge, regarded as more active than jalap and less violent than gamboge; the dose of the pure drug is 10 or 15 grains. In this country it is rarely used alone;



Scammony (*Convolvulus scammonia*).

it enters into the compound extract of colocynth, which is the basis of the popular compound cathartic pill. For medical use the resin, which is officinal, is preferable on account of the uniformity of its composition. The scammony root is officinal in the British Pharmacopœia.

SCANDERBEG (Turkish, *Iskander Beg*), an Albanian prince, whose true name was George Castriota, born in Croia about 1410, died in Alessio, Jan. 17, 1467. He was the fourth son of John Castriota, a Christian prince of a small district of Albania, of which the capital was Croia. Prince John, having been made tributary by Amurath II., was obliged to deliver up his four sons as hostages. The three elder died young, and George was educated as a Mussulman, became a favorite with Amurath, received the name of Iskander (Alexander), and was made *sanjakbeg* or commandant

of a district, with a force of 5,000 horse. On the death of his father in 1432 his principality was made a province with a Turkish governor, and from that time Scanderbeg resolved upon its recovery. He served for several years in the Turkish armies, and commanded the force sent against Serbia in 1439. In 1443 he was second in command of the army sent into Hungary, and in a battle on the Morava purposely gave the victory to John Hunyady. In the confusion of defeat he extorted a firman for the government of Albania from the sultan's chief secretary, whom with his attendants he immediately afterward slew. Hastening with a few hundred followers to Croia, the gates of which were opened to him, he assumed his hereditary sovereignty and abjured Islamism. The Albanians rose at his call, and in 30 days he had become master of all the fortresses in the country, giving the Turkish garrisons their choice between massacre and baptism. Being appointed generalissimo, he soon collected an army of 15,000 natives, French, and Germans, with which he defeated one of 40,000 under Ali Pasha. He overthrew three other large armies, and in 1449, and again in 1450, worsted Amurath himself, compelling him in the latter year, though his army numbered 100,000 men, to raise the siege of Croia and retreat. Mohammed II. continued the war with energy but without success, though Scanderbeg was sometimes defeated, and was harassed by internal dissensions and treason. Peace was concluded in 1461 at the suit of the sultan, leaving Scanderbeg in full possession of his territories. At the solicitation of Pope Pius II., he then went to Italy to support Ferdinand of Naples against John of Anjou, and secured the victory of Troja, Aug. 18, 1462, which drove John out of Italy. The pope, at the instance of the Venetians, having proclaimed a crusade against the Turks in 1463, Scanderbeg broke the truce, renewed the war, defeated the Turks in several battles, forced Mohammed with an army of 100,000 to retreat in 1465, drove another army of 80,000 from before Croia, and during three days massacred its remains in the defiles of Tirana. He successfully resisted his enemies to the last, and it was not until after his death that Albania was reduced by the Turks. He was buried at Alessio, and when the Turks took the town soon after, the janizaries disinterred his bones and used them as amulets. He left a young son to the guardianship of the Venetians, whose descendants held a Neapolitan dukedom. His life has been written in Latin by his friend Marinus Barletius (Frankfort, fol., 1537; translated into French, Italian, Portuguese, Spanish, and German); in French by C. Paganel (1856); and in English by Dr. C. C. Moore (New York, 1850).

SCANDINAVIA, the ancient name of that portion of Europe now comprised in the kingdoms of Denmark, Norway, and Sweden, and the island of Iceland.

SCANORES (Lat. *scandere*, to climb), an order of birds, comprising such as have the toes in pairs, two before and two behind, the latter being the outer anterior and the hind toes. This arrangement facilitates climbing, as is seen in the families of parrots, toucans, cuckoos, trogons, and woodpeckers. (See ORNITHOLOGY.)

SCAPULAR (Lat. *scapula*, the shoulder blade), a part of the habit of most ancient religious orders, and in particular a badge worn by the guild of the scapular of our Lady of Mount Carmel, as a symbol of the wearer's connection with the Carmelite order. The full religious habit called scapular is an oblong piece of cloth with a hole in the middle for the head, and falling over the shoulders and breast below the knees. It varies in color in different orders, and the same variety of color attaches to the symbolic scapular, the scapular of the passion being red, that of the immaculate conception blue, &c. That of Mount Carmel is composed of two small square pieces of brown cloth connected by ribbons or strings, and bearing emblems or monograms of Christ and his mother. This confraternity was first instituted about 1250 by St. Simon Stock, sixth general of the Carmelites, and spread rapidly from England throughout Christendom. It counted among its members Kings Edward I. of England and Louis IX. (saint) of France. It was endowed by the popes with many privileges and indulgences, and is the most popular guild in the Roman Catholic church.

SCARABÆUS (Linn.), the representative genus of a large family of pentamerous lamellicorn beetles, having the antennæ generally terminated by a club, and either composed of leaflets or of box-like joints. Of the old family several thousand species were enumerated, of about 200 genera, but these are now separated into many distinct families. The proper *scarabæidæ* or *coprophagi* comprise those which live in and feed upon excrements, especially those of herbivorous animals. The form is generally short and thick, and their color shining black or brilliant metallic; they excrete an oily matter, which prevents the substances among which they live from adhering to them; they are able to dig very rapidly into the ground; in the spring they enclose their eggs in small balls of dung, which they roll along with the hind feet to holes in which they are to be deposited.—The type of this family is the genus *ateuchus* (Weber and Fabr.), equivalent to the genus *scarabæus* of McLeay; this is peculiar to the old world, and of more than 40 species nearly 30 belong in Africa. The body is rounded, flattened above, the four posterior limbs hairy and ending in a single spur; the external edge of the wing covers is nearly straight, and the head is lobed and festooned in front. Two species were worshipped by the ancient Egyptians, and often represented by their hieroglyphics and on their monuments; models of them, in the most precious materials,

were worn as charms and buried with mummies; the insects themselves have also been found in their coffins. The *A. (S.) sacer* (Oliv.) is black and about an inch long, and is found in S. Europe, W. Asia, and N. Africa. The *A. (S.) Egyptiorum* (Latr.) is larger and wider,



Scarabæus (Ateuchus) Egyptiorum.

green with golden tints, and is found principally in Egypt. They were considered symbolic of the world on account of the globular form of the egg balls; of the sun, from the ray-like projections of the head; and of a warrior, from the belief that all were males, whence they were also worn as symbols by the Romans. As typical of the sun, the source of fertility, they were worn by women to render them prolific.

SCARBOROUGH, a seaport town of England, in the North riding of Yorkshire, 39 m. N. E. of York; pop. in 1871, 24,259. It is situated on a rocky declivity and along the N. shore of an open bay of the North sea. Its mineral waters are esteemed, and the town is much frequented in summer for sea bathing. It has two public libraries, several fine churches, a theatre, and a remarkable bridge on piers 75 ft. high, and extending over a chasm 400 ft. wide between the town and the spa.

SCARLATINA. See FEVERS, vol. vii., p. 170.

SCARLATTI. **I. Alessandro**, an Italian composer, born in Trapani in 1649, died in Naples, Oct. 24, 1725. He was instructed in music by Carissimi, and the introduction of violin accompaniments to airs, the ritornel, and the *da capo* are ascribed to him. He is said to have produced 200 masses, 100 operas, and 3,000 cantatas. **II. Domenico**, a composer, son of the preceding, born in Naples in 1683, died in Madrid or Naples about 1759. He was chapel-master to the queen of Spain, and produced numerous operas, but is best known by his compositions for the pianoforte, 42 in number, the successful performance of which was long regarded as the greatest test of excellence in a pianist.

SCARLET FEVER. See FEVERS, vol. vii., p. 170.

SCARPA, Antonio, an Italian anatomist, born at La Motta, a village of Friuli, June 13, 1747, died in Pavia, Oct. 31, 1832. He was educated at Padua, in 1772 became professor of anatomy in the university of Modena, and in 1783 at Pavia, and in 1814 director of the faculty of medicine. His principal works, in which surgical anatomy was first clearly developed,

illustrated with engravings which are among the most exact and elegant of their kind, have been translated into many languages.

SCARPANTO (anc. *Carpathus*), an island of Turkey, in the Mediterranean, 28 m. S. W. of Rhodes, 27 m. long and 6 m. broad; pop. about 5,000. It consists chiefly of bare mountains, the highest about 4,000 ft. Game, cattle, marble, and iron abound. The coast is generally inaccessible, but there are a number of harbors for small craft. In antiquity it belonged to the Dorians and subsequently to Rhodes.

SCARRON, Paul, a French author, born in Paris in 1610, died in October, 1660. He led a gay and dissolute life in his youth, but the death of his father left him penniless, and disease distorted his whole frame. He then applied himself to literature, and soon acquired such a reputation by his caricatures and humorous sketches as to be styled the "emperor of the burlesque." What he earned by his pen, together with the proceeds of a benefice granted him by his friend Lavardin, bishop of Le Mans, and a pension from the private purse of the queen, enabled him to live at ease, and his house was the favorite resort of wits and noblemen. During the war of the Fronde he was one of the opponents of Mazarin, and wrote the *Mazarinade*, which cost him his pension. In 1652 he married Françoise d'Aubigné, afterward celebrated as Mme. de Maintenon. His comedies, among which are *Jodelet* (1645), *Don Japhet d'Arménie* (1653), and *L'Ecolier de Salamanque* (1654), were well received; but he was indebted for his greatest success to his burlesque of Virgil, *L'Énéide travestie*. His best work is *Le roman comique*, which was translated into English by Oliver Goldsmith (2 vols., London, 1775). There have been numerous translations of all his writings, including his letters. The best edition of his complete works is that of Bruzen de la Martinière (10 vols. 12mo, Paris, 1737).

SCAURUS, Marcus Emilius. **I.** A Roman senator and consul, born in 163 B. C., died between 90 and 88. He studied eloquence, gained distinction in the army, and was elected curule ædile in 123, prætor urbanus in 120, consul in 115, censor in 109, and consul again in 107. During his first consulship he obtained a triumph for victories over the Ligurians and other Alpine tribes, and was made *princeps senatus*. He afterward accumulated great wealth by peculation and bribery, for which he escaped punishment by his eloquence and diligent discharge of duty. An embassy to Africa in 112, with Scaurus at its head, to secure justice to Adherbal from Jugurtha, having failed, war was declared by Rome, and Scaurus accompanied the army as legate of the consul Bestia. Jugurtha secured peace by bribing the leaders, which raised a great outcry at Rome; but Scaurus, though one of the most guilty, escaped by contriving to be appointed one of the *quæsitores* ordered to investigate the offence. **II.** Son of the preceding, chiefly celebrated for

his mercenary crimes. He was stepson to Sulla, whose proscriptions enabled him to add immensely to his wealth. In the third Mithridatic war he served as quæstor under Pompey, and in Judea received a large bribe from Aristobulus for deciding in his favor against his brother Hyrcanus, but Pompey reversed his decision. Having made a predatory incursion into Arabia Petrea, he was bought off by Aretas, the king, for 300 talents. In 58 B. C. he was elected curule ædile, and expended all his wealth to celebrate the games, building a temporary theatre, decorated with 360 columns and 3,000 statues, and large enough to hold 80,000 persons. He was prætor in 56, and in 55 governed Sardinia, whose inhabitants he plundered to obtain the means for paying his debts and securing the consulship. For this he was brought to trial before a tribunal presided over by Cato; but though his guilt was undoubted, his defence by Cicero, Hortensius, and other advocates, and his own tears and appeals to the splendor of his ædileship, procured his acquittal. Some time later he was condemned for illegal efforts to obtain office. His residence on the Palatine hill was celebrated for its magnificence.—His son MARCUS ÆMILIUS accompanied Sextus Pompey, his half brother, to Asia, and after the loss of his fleet betrayed him to the generals of Antony; and his grandson MAMERUS, called by Seneca the last of the Scauri, a dissolute orator and poet, was in the reign of Tiberius accused of adultery with Livia, and committed suicide.

SCHADOW. I. Johann Gottfried, a German sculptor, born in Berlin, May 20, 1764, died there, Jan. 26, 1850. He studied the antique in Rome, and going to Berlin in 1788 attracted notice by a monument to Count von der Mark, natural son of Frederick William II. He was thenceforth extensively employed on monumental works, among which are a colossal statue of General Ziethen at Berlin, equestrian statues of Frederick the Great at Stettin and of Blücher at Rostock, and a statue of Luther at Wittenberg. For the last 28 years of his life he was director of the academy of fine arts in Berlin. He published several works on art. II. Friedrich Wilhelm von Schadow-Godenhaus, a painter, son of the preceding, born in Berlin, Sept. 6, 1789, died in Düsseldorf, March 19, 1862. He went to Rome when young, coöperated with Cornelius and Overbeck in founding a new German school of art, and became a Catholic. He became professor in the Berlin academy of fine arts, succeeded Cornelius in 1826 as director of the Düsseldorf academy, and was ennobled in 1843. Specimens of his style are: "Mignon" (1828), frequently engraved; the "Four Evangelists," in the Werder church, Berlin; the "Wise and Foolish Virgins," in the museum in Frankfort; the "Fountain of Life," and an allegorical series entitled "Paradise," "Purgatory," and "Hell." After the completion of the last named work he became blind, but afterward partially re-

covered his sight. During his last illness he dictated a volume of memoirs.

SCHÄFER, Heinrich, a German historian, born at Schlitz, Upper Hesse, April 25, 1794, died in Giessen, July 2, 1869. He was professor of history at Giessen from 1833 till his death. His principal works are *Geschichte von Portugal* (5 vols., Hamburg and Gotha, 1836-'54), and *Geschichte von Spanien* (3 vols., 1831-'67), of which Lembke wrote the first volume. Both works form part of Ukert and Heeren's *Geschichte der Europäischen Staaten*. Among his later writings is *Ueber heutige Aufgaben der Geschichtschreibung* (Giessen, 1864).

SCHAFF, Philip, an American scholar, born in Coire, Switzerland, Jan. 1, 1819. He studied at Tübingen and Halle, graduated at Berlin in 1841, travelled as a private tutor, and lectured on theology in Berlin in 1842. Being invited to the chair of theology at Mercersburg, Pa., he was ordained at Elberfeld, and came to America in 1844. In 1845 he was tried for heresy and acquitted, and afterward continued to teach and write at Mercersburg, in connection successively with Dr. Nevin and Dr. Wolff. In 1854 he lectured in Germany on America, represented the American-German churches at the ecclesiastical diet of Frankfurt and the Swiss pastoral conference at Basel, and received the degree of D. D. from the university of Berlin. In 1863 he was appointed secretary of the sabbath committee of New York, and removed to that city; and in 1869 he was appointed professor in the Union theological seminary there. From 1867 to 1874 he was acting secretary of the American branch of the evangelical alliance, visiting Europe thrice in the interval; and in 1872 he became president of the American committee of the company of revisers of the English Bible. In August, 1875, he attended at Bonn a conference of Old Catholics, Greeks, and Protestants, held with a view of promoting Christian unity among the churches there represented. He has published in German "The Sin against the Holy Ghost" (Halle, 1841); "On James and the Brothers of Jesus" (Berlin, 1842); "The Principle of Protestantism" (German and English, Chambersburg, Pa., 1845); "History of the Apostolic Church" (Mercersburg, 1851; 2d ed., Leipsic, 1854; translated into English, New York and Edinburgh, 1853); "German Hymn Book, with a Historical Introduction, Critical and Biographical Notes" (Philadelphia and Berlin, 1859); and "Four Lectures on the Civil War in America, and Overthrow of Slavery" (delivered and published in Berlin, 1865). His works in English are: "What is Church History? A Vindication of the Idea of Historical Development" (Philadelphia, 1846); "St. Augustine, his Life and Labors" (New York, 1853; German, Berlin, 1854); "Ancient Church History" (3 vols., 1853-'68); "America, its Political, Social, and Religious Character," translated from his lectures at Berlin in 1854 (1855); "Germany, its Universities and Divines" (Philadel-

phia, 1857); "History of the Christian Church of the first three Centuries" (New York and Edinburgh, 1858); "The Moral Character of Christ, or the Perfection of Christ's Humanity a Proof of His Divinity" (1860); "Christ in Song" (1868); "The Vatican Decrees" (1875); and reports of the sabbath committee, 1863-'9, and of the evangelical alliance, 1867-'73. He has now in press (1875) a "History of the Creeds of Christendom," in 3 vols. From 1848 to 1853 he edited the *Kirchenfreund*, a German-American monthly, and was for some time co-editor of the "Mercersburg Review;" and he is editor of the American edition of Lange's commentary, to be completed in 27 volumes, of which 18 have appeared (1875).

SCHAFFHAUSEN. I. A N. canton of Switzerland, bounded S. by the Rhine and the cantons of Zürich and Thurgau, and on all other sides by Baden; area, 116 sq. m.; pop. in 1870, 37,721, chiefly Protestants, and all of German origin. The canton is traversed by low ramifications of the Jura range in the wider sense. The climate is healthy and temperate. Agriculture is the principal occupation. The government is democratic. Schaffhausen joined the Swiss confederation in 1501.

II. The capital of the canton, on the slope of a hill, on the right bank of the Rhine, 45 m. N. by E. of Zürich; pop. in 1870, 10,303. It is walled and overlooked by an old castle. It has college, library, arsenal, and manufactories of steel ware, railroad carriages, chemicals, and tobacco. About 3 m. below the town are the falls of the Rhine, from 60 to 75 ft. high.

SCHARF, George. See supplement.

SCHAUFFLER, William Gottlieb, an American missionary, born at Stuttgart, Germany, Aug. 22, 1798. He resided in Russia from his 6th to his 27th year, when he went to Turkey as an independent missionary. Feeling the need of more education, he came to America, spent five years at Andover seminary, and in 1832 was sent back to Turkey by the American board of missions. He published in English, "Essay on the right Use of Property" (1832), and "Meditations on the Last Days of Christ" (1837; new eds., 1853 and 1858). He has translated the Bible into Hebrew-Spanish and Turkish. Of the latter version the New Testament has been published, and the Pentateuch and Isaiah are in course of publication in Germany under the author's supervision (1875). He received the degree of D. D. from the university of Halle in 1867.

SCHAUMBURG-LIPPE, a principality of the German empire, embraced between the Prussian provinces of Hanover, Hesse-Nassau, and Westphalia; area, 171 sq. m.; pop. in 1871, 32,059. The surface toward the north is level, but becomes hilly in the south, and the soil is very fertile. There are only a few small streams, tributaries of the Weser. A large forest, the Schaumburger Wald, is in the west, and the Steinhuder Meer, a small lake, in the north. Coal and limestone are found. It has one vote

in the federal council, and sends one deputy to the Reichstag. The local legislature or diet consists of one chamber with 15 members. The reigning prince is Adolphus (born Aug. 1, 1817), who assumed the reins of government in 1860. Capital, Bückeburg.

SCHEELE, Karl Wilhelm, a Swedish chemist, born in Stralsund, Pomerania, Dec. 19, 1742, died at Köping, near Stockholm, May 21, 1786. In 1777 he was appointed by the medical academy apothecary at Köping. With the exception of Priestley, he probably discovered more new substances than any other chemist, including tartaric acid, manganese, chlorine, barytes, the pigment called Scheele's green, and the coloring principle of Prussian blue. (See CHEMISTRY, vol. iv., p. 362.) In his "Chemical Observations and Experiments on Air and Fire" (Stockholm, 1777; translated into English by Kirwan), with no knowledge of the previous discovery of Priestley, he described oxygen under the name of "empyreal air."

SCHEFFER. I. Ary, a French painter, born in Dort, Holland, in 1795, died at Argenteuil, near Paris, in June, 1858. At 12 years of age he painted a historical picture which attracted much attention in Amsterdam. Subsequently he studied in Paris under Baron Guérin. His most characteristic works are devoted to religious subjects. These include his *Christus Consolator*, "Dead Christ," "Three Marys," "Christ weeping over Jerusalem," *Mater Dolorosa*, and the "Temptation." His several pictures of "Mignon," his "Francesca da Rimini," "Dante and Beatrice," and illustrations from "Faust," are widely known by engravings. He painted a few portraits, including those of Lafayette, Talleyrand, Béranger, Lamartine, and Charles Dickens. His life has been written by Mrs. Grote (London, 1860). In 1862 a monument was erected to him at Dort. **II. Henri,** brother of the preceding, born at the Hague, Sept. 27, 1798, died in Paris, March 15, 1862. He also was a pupil of Guérin, and among other celebrated pictures painted "Charlotte Corday protected against the Fury of the Populace by Members of the Convention," "The Battle of Cassel," "Joan of Arc at Orleans," and a large number of religious subjects and portraits. His daughter married Renan.

SCHELDT (Flem. *Schelde*; Fr. *Escaut*; anc. *Scaldis*), a river of France, Belgium, and Holland, having its source in a small lake near St. Quentin in the French department of Aisne. It first flows N. by Cambrai to Condé, then N. W. to the frontiers of West Flanders, Belgium, then N. N. E. between that province and Hainaut into East Flanders, E. through the latter province after passing Ghent, then N., forming the boundary between Antwerp and East Flanders, and finally turns W. by N., and enters the North sea in the Dutch province of Zeeland by two broad mouths called the Hond or West Scheldt (the main stream) and the East Scheldt, enclosing the islands of

North and South Beveland and Walcheren. The lower part is bordered with dikes. Its principal tributaries are the Heine, Dender, and Rupel on the right, and the Sensée, Scarpe, and Lys on the left. The chief towns on its banks, besides those named, are Valenciennes, Tournay, Oudenarde, Dendermonde, and Antwerp. Its length is 211 m., and it is navigable to within a few miles of its source. The canal of St. Quentin, 50 m. long, connects it with the Somme and the Oise.

SCHELLING, Friedrich Wilhelm Joseph von, a German philosopher, born at Leonberg, near Stuttgart, Jan. 27, 1775, died at Ragatz, Switzerland, Aug. 20, 1854. His father was pastor at Leonberg, and subsequently prelate at Maulbronn. Friedrich entered the university of Tübingen in 1790, and studied philosophy under Adler, a disciple of Wolf, and divinity with Storr. His essay for the doctorate of philosophy was on the origin of evil, as narrated in Gen. iii. His next treatise, in Paulus's *Memorabilia* (1793), was on myths and sagas. In 1795 appeared his first metaphysical essay, "On the Possibility of a Form of Philosophy," and a few months later his dissertation, *Vom Ich als Princip der Philosophie, oder über das Unbedingte im menschlichen Wissen*. In his *Philosophische Briefe über Dogmatismus und Criticismus*, in Niethammer's *Journal* (1795), he grapples with Kant's sundering of the respective spheres of the theoretical and practical reason, denouncing this dualism, and contending that there must be something unconditional, which is the common source of both the objective and the subjective. There is "an intellectual intuition" of the unconditional. Allowing the equal validity of both the subjective and objective, he already demands for both a higher unity. Thus at the age of 20, before he left the university, he had found the principle of his peculiar system, which was to supersede the critical philosophy of Kant and the subjective idealism of Fichte. After leaving Tübingen, he taught for two years at Leipsic, and wrote "Illustrations of the Idealism of the Theory of Science" (Fichte's). A severe nervous fever brought him to the borders of the grave. At the age of 24 he went to Jena, parted company with the idealism of Fichte, and began his more independent career in a series of brilliant lectures, which aroused the highest enthusiasm. At Jena he taught with Fichte and Hegel. The latter was older in years, but younger as a student. They edited the *Kritisches Journal der Philosophie* together, and were not yet sensible of their divergence. Here was developed the second stage of Schelling's speculations, in his philosophy of nature and transcendental idealism. In rapid succession he published *Ideen zu einer Philosophie der Natur* (vol. i., 1797, the only one published); *Von der Weltseele, eine Hypothese der höheren Physik zur Erklärung des allgemeinen Organismus* (1798; later editions contain also an essay *Ueber das Ver-*

hältniss des Realen und Idealen in der Natur); *Erster Entwurf eines Systems der Naturphilosophie* (1799); an "Introduction" to the last named; and *System des transcendentalen Idealismus* (1800). Most of these works were originally read as lectures, and some of them more carefully digested in the *Neue Zeitschrift für speculative Physik* (1802-'3). His choice of nature as the subject of his speculations indicated his revolt from the subjective tendency. He said: Nature is life, a living organism, replete with formative powers; there is an ideal in the real, a subject in the object, reason in matter. Nature is autonomic; there is a soul of the world, its immanent principle. Grasping this soul, we re-create nature. It is all one living organism, a perpetual process of production, through the whole series of inorganic and organic forms. All is pervaded by one law, the law of evolution; and that law is a law of polarity, of polar forces. These act and react perpetually, as is seen in the phenomena of magnetism, electricity, and chemical agency. The mechanical theory of nature was superseded by the idea of living forces. Experiment has verified some of Schelling's prognostications; but the progress of research has left to his system as a whole only the value of a bold attempt at the reconstruction of nature. He applied the same principle of polarity in a more universal sense in his "Transcendental Idealism," which gives the outlines of the philosophy of spirit. The attempt is here made to derive all parts of philosophy from the intellectual intuition, considered as an act of the subject bringing the objective before it, an act in which the highest freedom and the highest necessity concur. Here the theoretical and practical parts of philosophy are unfolded, including an outline of the course of history, as a drama, which one mind has poetized; but that one mind is not yet with Schelling a personal deity. The third division of this treatise is on the "Philosophy of Art," following out the hints contained in Kant's "Criticism of the Judgment." Art is well nigh deified; it is viewed as the highest product of man, the perfected union of the ideal and the real, of the subject and the object. The infinite embodied in the finite is in every work of art; the artist grasps the eternal idea and realizes it in a perfected form; he is a creative genius, and yet works under the law of necessity. These views are further unfolded in his elaborate essay *Ueber das Verhältniss der bildenden Künste zur Natur* (1807). By an inward and logical necessity Schelling was led on to another, the third stage of his system, known as the philosophy of identity. He had already considered nature by itself, and spirit by itself; but the two, in a complete system, cannot remain sundered. The ideal and the real, the subjective and the objective, he next says, are identical. This he attempts to show in his exposition of his system in the *Zeitschrift für speculative Physik*

(1801), in relation to nature—a fragment of his project; and in a more popular way, in his *Vorlesungen über die Methode des akademischen Studiums* (1803). In this doctrine of absolute identity we have the most enigmatical and obscure, not to say paradoxical stage of his philosophy, which at that time, as Hegel said, “he made before the public,” not yet waiting, as Kant always did, for his ripened statements. If taken as his whole and final system, it is a pantheistic mysticism; but Schelling, in his later account of it, says that it represents only the negative, abstract side of his philosophy, to be supplemented by its positive and historical portions. This system of absolute identity is constructed in the geometric method, following the example of Spinoza; and the ideal and real poles are in fact parallel with the two “modes” of thought and extension in the ethics of Spinoza. It is around this point that the subsequent speculations of Schelling revolve, though for many years he struggled in the vain attempt to reconcile the pantheistic tendencies of these earlier essays with the theistic and Christian positions which he gradually adopted and defended. In this transition period he was called from Jena to Würzburg (1803), where he taught for two years, in fellowship and sometimes in rivalry with Paulus and J. J. Wagner. In 1808 he became secretary of the academy of the arts of design in Munich; in 1820 he withdrew to Erlangen to write his *Philosophie der Mythologie* and *Philosophie der Offenbarung*, which form vols. ii., iii., and iv. of his collected works published after his death by his sons. In 1826, when the university of Landshut was removed to Munich, he accepted a chair, and attracted enthusiastic auditors from all parts of Germany, from France, England, and Greece. Several works which he had in the mean while published indicate the struggles and developments of his system. In his *Bruno, oder über das göttliche und natürliche Princip der Dinge* (1802), he discoursed, in the manner of the Platonic dialogue, upon the unity of the infinite and finite, the possible and the real, as these must be found in the eternal being; expressly denying that the knowledge of the absolute can be attained in “a merely logical way.” His work *Philosophie und Religion* (1804) develops the idea of divine freedom in relation to creation. Still maintaining (what he subsequently denied in his essay on “Freedom”) that the finite as such implies the fall, he here denies that there can be any emanation of the world from God, and says that the transition can only be made by a leap, by an act, and an act of free will. In his *Darlegung des wahren Verhältnisses der Naturphilosophie zur verbesserten Fichte’schen Lehre* (1806), the theosophic element becomes more prominent; the Christian mystics and Boehm affect his theories and statements. He was feeling his way to the position decisively taken in the introduction to the first volume of

his collected works (*Philosophische Schriften*, 1809), and in the *Untersuchungen über das Wesen der menschlichen Freiheit*, which forms the concluding treatise of that volume. In the preface he says the real antagonism of philosophy is found in the two ideas of necessity and freedom. The question of sin and its origin is the capital and decisive inquiry. God is viewed as a person and a will. There still remains a “dark ground” in deity, by which to explain creation and sin, but the personal deity (he alleges in his later expositions) is the *prius* and lord of this “nature in God.” Freedom in the creature is essentially the possibility of good and evil. Out of the *nexus* of cause and effect, beyond even the sphere of consciousness, each individual determines his nature by an act which, though “out of all time,” is still recognized as free by the sense of responsibility and guilt. In his *Denkmal* against Jacobi (1812) he denies that there can be two kinds of philosophy, and insists on the necessity of a scientific theism, which should recognize God as the absolute personality, and yet find in him the basis of all real existence. A “Reply to Eschenmayer” (in the *Allgemeine Zeitschrift*) refutes the objection that he, like Boehm, puts “Satan in God.” *Ueber die Gottheiten von Samothrake* (1816) is a classical fragment of his mythology, somewhat arbitrary in its hypotheses. Sixteen sheets of his *Vorlesungen über die Philosophie der Mythologie* were printed in 1830, but withdrawn from circulation. Nearly 20 years had now passed since he had published any marked work. Meanwhile Hegel had elaborated his system, with a more logical and constructive talent; introducing a principle of movement, which was not a personal will, into the absolute being, and identifying the logical process of the idea with the development of real being. Cousin wrote a slight sketch of German philosophy; Beckers put it into German; and Schelling broke his long silence by writing a preface, in which he accused Hegel of constructing his whole scheme upon a misunderstanding of the true sense and import of the system of identity. About ten years after Hegel’s decease his instructor became his successor at the university of Berlin (1841). The capital of Prussia greeted him with open arms. Frederick William IV., Neander, and Müller hailed him with encouragement. He was lauded as the *spiritus rector* of the century, who through philosophy was to lead philosophy back to Christ. The Hegelians accused him of recreancy to the “idea,” of theosophy, of mysticism. His lectures were published, without his consent, by both Frauenstädt and Paulus. But he lectured only a few semesters, and then withdrew from public life to perfect the details of his system. His physical constitution was vigorous, and his mental clearness was unimpaired to the last. Two of his sons, Karl Friedrich August and Hermann, have published an edition of his collected works (14

vols., Stuttgart and Augsburg, 1856-'61). The first ten volumes give all his writings in chronological order, including several treatises previously unpublished. The remaining volumes give the later system.—Fundamental in his system, in its latest exposition, is the distinction between the negative and the positive philosophy; between the abstract and the historical; between the philosophy of the idea and the philosophy of what is real. The negative philosophy gives the logical and metaphysical basis of the whole; it is the *prima philosophia*, the first, but not the highest, philosophy; the *quid sit*, but not the *quod sit*. He reviews the old metaphysics from Plato and Aristotle to Kant and Hume; and the result is the system of pure ideas, of being as such, but yet of being, not in its reality, but in its abstract and necessary possibilities. Logically antecedent to being, as one of its potences or powers, is the possibility of being (*das Seyn-Können*); then comes pure being itself (*purus actus—das reine Seyn*); and then the union of the two, as the subject-object, or spirit. These three potences are at the basis of all, in idea; they are the potences of absolute being, which as a principle of development can only be grasped as absolute spirit, absolute personality, absolute will. In other words, the transition from the absolute to the relative, from the infinite to the finite, cannot be deduced from being and its predicates, but can only be achieved by personal will. Yet in making this transition, these three potences of being are also the means or factors of the developing process. The three potences become distinct personalities in the process of creation, and work for a time separately and even in collision. Thus the Trinity is not a God in three Gods, but God in three personalities, and at the consummation of the process takes on a still higher form. Man was created with the possibility of good and evil; against God's will he chose the evil, and became subject to temporal and eternal death; and yet the ground for this evil is also found, says Schelling, in the first of the three principles of the Divine Being, passing through the "theogonic process," in conflict with the other principles. Satan is not eternal, and is not a creature; it is a principle, a spirit, which became personal, especially in the height of the conflict with Christ. The fall is before and beyond history; the narrative in Genesis is true on the mythological standpoint. After the fall came the mythological process, through which the second divine personality passes; the whole history of mythology is not an accidental but a necessary process. In the Old Testament he recognizes type and symbol as everywhere pointing to Christ, the Logos; mythology and Judaism unite in him. But in Christianity Christ is the centre, the very substance. The incarnation is not a parting with the divine glory and attributes, but a resuming of them. Christ as incarnate is not from, but in, two natures; there is

not a human personality, the only personality is divine. His sacrificial death was necessary to make expiation for sin; and through this death man again obtains freedom and justification. Justification precedes good works. So, too, the resurrection comes through Christ alone; without the resurrection, the soul, separate from the body, would be in an unnatural state, a state of comparative torpor. Through and by this process of redemption, the Trinity too is completed. God is no longer merely in three personalities (as in the creation), but there are now three persons, each of whom is God. Schelling also unfolds the philosophy of church history, making three stages, corresponding respectively to the apostles Peter, Paul, and John. We are now in the Pauline stadium; that of John will follow, and complete the whole. Paul is the apostle of the Son, and John of the Spirit. Schelling found many disciples and followers, and the development given by them to the principal doctrines has caused their philosophy to be designated as "New Schellingism." Schleiermacher and Hegel were in a measure pupils of Schelling, though they established philosophical schools of their own.—See Rosenkranz, *Schelling* (1848); Michélet, *Die neueste Deutsche Philosophie* (1848); Noack, *Die Philosophie der Romantik* (1860); and the histories of philosophy by Chalybäus, Ritter, Erdmann, Ueberweg, and Thilo. Erdmann has also published a valuable sketch of his negative philosophy. In Coleridge's "Biographia Literaria" will be found some account of Schelling's system in its absolute identity phase. Of special interest, particularly in regard to the history of the growth of Schelling's views, is *Fichte's und Schelling's philosophischer Briefwechsel* (1856). The "Introduction" to Schelling's *Erster Entwurf eines Systems der Naturphilosophie* has been translated by Davidson in the "Journal of Speculative Philosophy" (St. Louis, 1867). His life has been written by Plitt, *Aus Schelling's Leben* (3 vols., 1869-'71). See also *Friedrich Wilhelm Joseph von Schelling, eine Jubiläums-Gedächtnissrede*, by O. Pfeiderer (Stuttgart, 1875), and *Schelling's Geistesentwicklung*, by Hubert Becker (Munich, 1875).

SCHEMNITZ (Hun. *Selmecz-Bánya*), a town of N. W. Hungary, in the county of Hont, on the Schemnitz, a tributary of the Gran, 65 m. N. by W. of Pesth; pop. in 1870, 14,029. It is closely hemmed in by hills, and consists chiefly of one steep and narrow street and of several suburbs. It contains four Catholic churches and one for Protestants, and a mining academy founded in 1760. The gold, silver, lead, copper, iron, sulphur, and arsenic mines, long among the most important in Europe, have much fallen off in production, though still employing about 8,000 persons. All the government mines are connected with each other, and below them are two main adits, of which the lower one, the Joseph II. adit, is a magnificent work, 12 ft. high, 10 ft. wide, and ex-

tending 10 m. to the valley of the Gran, and is used for a canal and a railway.

SCHENCK, Robert Cumming, an American statesman, born at Franklin, Warren co., Ohio, Oct. 7, 1809. He graduated at Miami university in 1827, and was admitted to the bar in Dayton. In 1840-'42 he was a member of the Ohio legislature, in 1843-'51 a representative in congress, and in 1851-'3 minister to Brazil. In 1861 he served as a brigadier general and subsequently as major general of volunteers, and was wounded at the second battle of Bull Run (1862). He was again a member of congress from 1863 to 1871, and in the latter year was appointed minister to England, which post he still holds (1875).

SCHENECTADY, an E. county of New York, traversed by the Mohawk river, the Erie canal, and several railroads; area, 221 sq. m.; pop. in 1875, 24,895. The soil in the valley of the Mohawk is very fertile. The chief productions in 1870 were 5,006 bushels of wheat, 53,730 of rye, 103,533 of Indian corn, 233,199 of oats, 43,465 of barley, 67,651 of buckwheat, 322,902 of potatoes, 35,457 tons of hay, 4,700 lbs. of tobacco, 29,393 of wool, 557,770 of butter, and 42,020 of hops. There were 3,816 horses, 6,185 milch cows, 3,769 other cattle, 7,938 sheep, and 3,894 swine. The raising of broom corn and the manufacture of brooms are important industries; in 1870, 17 establishments produced \$325,148 worth of brooms and wisp brushes. Capital, Schenectady.

SCHENECTADY, a city and the county seat of Schenectady co., New York, on the S. bank of the Mohawk river, and on both sides of the Erie canal, 17 m. N. W. of Albany; pop. in 1850, 8,921; in 1860, 9,579; in 1870, 11,026; in 1875, 13,171. It communicates with the principal points in the state by means of the New York Central and Hudson River, the Schenectady and Saratoga, the Schenectady and Duaneburgh, and the Schenectady and Troy railroads. It is largely engaged in manufacturing, the principal establishments being numerous broom factories, extensive locomotive works, engine and boiler works, iron works, knitting mills, two manufactories of agricultural implements, one each of shawls, galvanized and corrugated iron, pumps and fire engines, steel springs and iron railing, artificial limbs, stoves, and wheelbarrows, and two planing mills. There are four banking establishments, with an aggregate capital of \$400,000, four principal hotels, three public halls, a union school and several branches, two daily and four weekly (one German) newspapers, and 17 churches, viz.: African, Baptist, Congregational, Episcopal (2), German Lutheran, Jewish, Methodist (2), Presbyterian (2), Reformed (3), Roman Catholic (2), and Universalist. Schenectady is the seat of Union college, one of the oldest institutions of learning in the country. Its buildings, three in number, are on the heights overlooking the city. (See UNION UNIVERSITY.)—The town was settled

by Arent Van Corlear in 1661, and a fort was built. On Feb. 9, 1690, the Indians and French massacred the inhabitants, sparing only 60 old persons and children; and in 1748 it was again taken and a large number of persons put to death. It was incorporated as a city in 1798.

SCHENKEL, Daniel, a German theologian, born at Dögerlin, Switzerland, Dec. 21, 1813. He studied in Basel and Göttingen, and in 1841 became a clergyman in Schaffhausen and a member of the grand council. In 1849 he went as professor of theology to Basel, and in 1851 to Heidelberg. His removal, demanded by a portion of the clergy in 1864 on account of his liberal views, was not granted by the authorities of Baden. In 1865 he was one of the most prominent founders of the German Protestant union. He edited the *Allgemeine Kirchenzeitung* from 1852 to 1859, and the *Allgemeine kirchliche Zeitschrift*, which he founded, from 1859 to 1872; and in 1867 he began to edit the *Bibelllexikon*, which he completed in 1875 (5 vols., Leipsic). His principal works are: *Das Wesen des Protestantismus* (3 vols., Schaffhausen, 1846-'51; 2d ed., 1861); *Christliche Dogmatik* (2 vols., Wiesbaden, 1858-'9); *Das Charakterbild Jesu* (1864; 4th ed., enlarged, 1874; English translation by W. H. Furness, 2 vols., Boston, 1866); and *Brennende Fragen* (1869).

SCHERIA, in the Odyssey, an island at the west end of the earth, inhabited by the Phæacæes, a people fond of the feast, the lyre, and the dance. The ancients identified it with Coreyra.

SCHERR, Johannes, a German author, born at Hohenrechberg, Würtemberg, Oct. 3, 1817. He graduated at Tübingen in 1840, and with his brother Thomas Ignaz, a prominent educator, conducted a school at Winterthur, Switzerland. After some years he established himself in Stuttgart, but his republican sympathies compelled him in 1849 to take refuge in Switzerland. He first resided in Zürich, but returned to Winterthur in 1852, and resided there till 1860, when he became professor of history at the polytechnic institute in Zürich. His principal works are: *Geschichte der deutschen Literatur* (2d ed., Leipsic, 1854); *Geschichte der englischen Literatur* (1854; 2d ed., revised and enlarged, 1874); *Geschichte der Religion* (3 vols., 1855-'7); *Allgemeine Geschichte der Literatur* (4th ed., Stuttgart, 1872); *Schiller und seine Zeit* (3d ed., 1862); *Geschichte der deutschen Frauenwelt* (2 vols., 2d ed., 1865); *Blücher, seine Zeit und sein Leben* (3 vols., 2d ed., 1865); *Studien* (3 vols., 1865-'6); *Hammerschläge und Historien* (Zürich, 1871); *Dämonen* (Leipsic, 1872); and *Goethe's Jugend: Die Frauenwelt geschildert* (Leipsic, 1874).

SCHERZER, Karl von, chevalier, a German traveller, born in Vienna, May 1, 1821. He learned the trade of a printer, and was employed by Brockhaus in Leipsic and in the government printing establishment in Paris.

In company with Moritz Wagner he travelled in the United States, Central America, and the West Indies, from 1852 to 1855; and from 1856 to 1859 he was a member of the Austrian Novara expedition round the world. In 1869 he was placed at the head of an expedition to eastern Asia, and before returning to Europe went alone from Japan to California, and spent some time in Guatemala. In 1872 he was appointed Austrian consul general at Smyrna. He published works on his American travels, partly in conjunction with Wagner (1854-'7); his principal subsequent works are: *Beschreibende Theile der Reise der österreichischen Fregatte Novara um die Erde* (3 vols. 4to, Vienna, 1861-'2); *Aus dem Natur- und Völkerleben im tropischen Amerika* (Leipsic, 1864); *Statistisch-commerzieller Theil der Novara-Expedition* (2 vols., Vienna, 1864; new ed., Leipsic, 1867, entitled *Statistisch-commerzielle Ergebnisse einer Reise um die Erde*); *Fachmännische Berichte über die österreichisch-ungarische Expedition nach Siam, China und Japan* (Stuttgart, 1868-'71); and *La province de Smyrne* (1875).

SCHEVENINGEN, a watering place of the Netherlands, on the seashore, 8 m. N. W. of the Hague; pop. about 8,000. It contains a fine old church, a royal pavilion, and a large hotel belonging to the corporation of the Hague. The inhabitants are engaged in fishing. The English fleet under Monk defeated in this vicinity the Dutch commanded by Van Tromp, who was killed, Aug. 10 (N. S.), 1653.

SCHICK, Gottlieb, a German painter, born in Stuttgart, Aug. 15, 1779, died there, April 11, 1812. He completed his studies in Paris under David and in Rome, where he finished in 1803 his "David before the angry Saul," followed in 1805 by "Noah's Thank Offering" and an admirable portrait of his friend Wilhelm von Humboldt. Among his other works are "Apollo among the Shepherds" (1807), landscapes, portraits, and Scriptural paintings.

SCHIEDAM, a town of the Netherlands, in the province of South Holland, near the junction of the Maas with the Schie, 4 m. W. of Rotterdam; pop. in 1873, 20,778. It is well built, has many canals, and contains one Catholic and five Protestant churches. The finest public building is the exchange. It is the centre of the trade in spirituous liquors. There are nearly 300 distilleries, chiefly of gin, celebrated under the name of hollands or Schiedam schnapps.

SCHILLER, Johann Christoph Friedrich von, a German poet, born at Marbach, Württemberg, Nov. 10, 1759, died in Weimar, May 9, 1805. He attended a Latin school at Ludwigsburg, to which town his parents had removed in 1768. His father then became inspector of the palace of Solitude, near Stuttgart, where Friedrich in 1773 entered the ducal military seminary, which in 1775 was transferred to Stuttgart as a military academy. Schiller was first destined for the church, and next for the law, but he

chose medicine, and in 1780 became a surgeon in the army. At an early age he had composed poetry and dramas, and for several years he had been engaged on the tragedy *Die Räuber*, which on its publication in 1781 created an immense sensation. The duke of Württemberg, fearing the effect of this work, which idealized brigandage, ordered the author to adhere to his profession. Schiller nevertheless remodelled the play for the stage, and was arrested at Stuttgart for stealthily witnessing its first performance at Mannheim. He escaped from Württemberg in October, 1782, to Baden, and subsequently found a refuge in the house of Frau von Wolzogen at Bauerbach, near Meiningen, whose sons had been his fellow pupils, and in September, 1783, became connected as a dramatist with the Mannheim theatre. He remained there about 18 months, during which he translated "Macbeth," and wrote the tragedies *Die Verschwörung des Fiesco* and *Kabale und Liebe*. He also founded the *Rheinische Thalia*, and published in that periodical the opening acts of his drama *Don Carlos* and some poems. About the same time appeared his *Philosophische Briefe*. In 1785 he went to Leipsic, and thence to Dresden, where he finished *Don Carlos*, and in 1787 to Weimar. Here he met Charlotte von Lengefeld (who afterward became his wife), Herder, and Wieland. In 1788 he for the first time saw Goethe, but their intimate acquaintance began several years later at Jena. In 1788 appeared the first and only volume of Schiller's unfinished *Geschichte des Abfalls der Niederlande*. In 1789 he was appointed professor of history at Jena, and in 1791 finished his "History of the Thirty Years' War," according to Carlyle "the best historical performance which Germany could boast of." Between these two works appeared his strange fragmentary story *Der Geisteseeher*. Another of his anomalous productions was *Der Verbrecher aus verlorener Ehre*. After recovering from a severe pulmonary attack, he continued to work with the same intensity as before, and became absorbed in Kant, whose philosophy suggested to him many profound æsthetic disquisitions. He also wrote essays and minor poems for the *Horen*, and edited the *Musenalmannach*, in which he and Goethe retorted upon their critics with metrical epigrams (*Xenien*). For some time he worked almost all night, taking stimulants, which undermined his health. His beautiful ballads appeared mostly during this period. In 1799 appeared his drama *Wallenstein*, one of his greatest works, upon which he was engaged for seven years. It is in three parts, *Wallenstein's Lager*, *Die Piccolomini*, and *Wallenstein's Tod*; the last two were translated by Coleridge. Soon afterward he removed to Weimar, where his genius was stimulated by a closer communion with Goethe. Between 1799 and 1801 he produced the dramas *Marie Stuart*, *Die Jungfrau von Orleans*, and *Die Braut von Messina*, and *Das Lied von*

der Glocke, besides many other exquisite poems. In 1804 he completed *Wilhelm Tell*, the last and one of the noblest of his dramatic works. Shortly before his death he said: "Many things are now becoming intelligible and clear to me." The grand ideal pervading all his writings is that of the highest intellectual and moral culture as a groundwork of liberty, and he expressed his thoughts in prose and poetry with impassioned eloquence and at the same time with artistic grace and felicity. As a picturesque dramatist, whose ideality and genius soared highest in depicting the triumphs of virtue, liberty, and patriotism, and in creating lofty types of womanhood and manhood, he imparted to others his own enthusiasm, and impressed the heart of the people more powerfully than any other German poet. In person Schiller was tall and spare, his complexion was pale, his brow high and instinct with thought, his nose aquiline, his mouth of exquisite beauty; his hair inclined to auburn, and his eyes were blue and full of fire. Dannecker's bust in the Weimar library is the best likeness of him. In 1827 his remains were removed to the prince's vault in the new Weimar cemetery. The finest statues of him are by Thorwaldsen in Stuttgart (1839) and by Rietschel in the Schiller-Goethe monument at Weimar (1857). The celebration of his centennial in 1859 resulted in a number of monuments being erected in his honor in Germany and elsewhere. Among the latest are those erected in 1871 in Berlin and in 1874 in Vienna; and one is to be erected in 1876 at Marbach. In 1859 the Schiller funds for relieving indigent authors were merged with the central association in Dresden, which in 1872 had a surplus of about \$300,000.—The complete and partial editions of Schiller's works, which include translations and adaptations, short historical sketches, and various fragments, are exceedingly numerous. The first, incomplete, was published by his friend Körner (12 vols., 1812-'15). The most recent and complete has been published under the supervision of Gödeke (1867-'75), and Schiller's youngest daughter published in 1867 *Schiller's Dramatische Entwürfe*. The most celebrated English versions of his poems are by Bulwer, J. S. Dwight, N. L. Frothingham, and W. H. Furness. The best English biographies of Schiller are Carlyle's (1825; German translation, with an introduction by Goethe, 1830) and Bulwer's (1847). The principal German biographies are by Schiller's sister-in-law, Caroline von Wolzogen (2 vols., 1830; new eds., 1845 and 1851), Hoffmeister (5 vols., 1837-'42; new ed. enlarged by Viehoff, 1846-'53; completed, 3d ed., 3 vols., 1873), Schwab (1840; 4th ed., 1859), and Pallaske (2 vols., 1858-'59; English translation by Lady Wallace, 1859; 5th German ed., 1872). See also *Schiller's Jugendjahre*, by Boas (2 vols.,

1856); *Goethe und Schiller*, by Gödeke (1859); *Schiller und seine Zeit*, by Scherr (1859); *Schiller's Kalender*, 1795-1805, by his daughter Emilie von Gleichen-Russwurm (1865); his correspondence with Goethe (6 vols., 1828; new ed., 1856, and one including Düntzer's *Schiller und Goethe*, 1859; English translation by G. H. Calvert, Boston, 1845), with Wilhelm von Humboldt (1830), with Körner (4 vols., 1847; new ed., enlarged by Gödeke, 1874); *Schiller's Briefe* (3 vols., 1846; with historical comments, 1854-'7); his correspondence with his sister Christophine and her husband Reinwald, edited by Maltzahn (1874); and *Schiller's Verhältnisse zu dem Publikum seiner Zeit*, by Oskar Brosin (1875).—Schiller's widow died in 1826. They had two sons and two daughters. The youngest of the latter, the baroness von Gleichen-Russwurm, died in 1872. His only surviving male descendant (1875) is his grandson, Friedrich Ludwig Ernst von Schiller, an officer in the Austrian army.

SCHILLING, Johannes, a German sculptor, born at Mittweida, Saxony, June 23, 1828. He studied in Dresden and Berlin, and spent several years in Rome. In 1868 he became professor at the royal academy of art in Dresden. His principal works are "Amor and Psyche," the Schiller monument in Vienna, and especially his four groups representing the seasons, for which he received a first prize in 1861, and which were placed in 1872 on the Brühl terrace in Dresden. In 1872 he also received the second prize of 1,000 thalers for his design for a projected national monument in the Niederwald. In 1874 he finished four life-size figures for the Schiller monument in Vienna.

SCHINKEL, Karl Friedrich, a German architect, born in Neu-Ruppin, Prussia, March 13, 1781, died in Berlin, Oct. 9, 1841. He studied in Berlin, in Italy, and in France, became known in 1808-'14 as a painter of dioramas, and afterward acquired celebrity as architect of some of the finest public works in Berlin, where he became professor in the academy of fine arts in 1820. He excelled also as a historical and decorative painter, and a special museum in Berlin bearing his name has been opened for his works. His *Sammlung architektonischer Entwürfe* (Berlin, 1820-'37) and *Werke der höhern Baukunst* (Potsdam, 1845-'6), have passed through many editions.—See *Aus Schinkels Nachlass*, by Wolzogen (4 vols., Berlin, 1862-'64), and the biographies by Kugler and others.

SCHIRMER, Johann W. See supplement.

SCHLAGINTWEIT, Hermann, Adolf, and Robert, German travellers, the first born in Munich, May 13, 1826; the second born Jan. 9, 1829, killed in Kashgar, Aug. 26, 1857; the third born Oct. 27, 1833. While at the university Hermann and Adolf made explorations of the Alps, and published the results in their *Untersuchungen über die physikalische Geographie der Alpen* (Leipsic, 1850). After spending some time in England and Scotland, they renewed in 1851 their explorations of the Alps,

visited Piedmont and Savoy, and devoted themselves especially to observations and measurements in the vicinity of Monte Rosa. They were the first to ascend the highest peak of this mountain (Aug. 23, 1851), and to make an accurate measurement of its elevation; and they remained for 14 days on its S. W. slope, at a height of 10,000 ft. In 1852 they explored the Bavarian Alps, where in 1853 also Adolf made geological observations. The results of their researches were published in *Neue Untersuchungen über die physikalische Geographie und die Geologie der Alpen* (illustrated, Leipsic, 1854). In the same year they produced two maps in relief of Monte Rosa and of the Zugspitze, the highest peak in Bavaria. At the suggestion of Bunsen and Humboldt, Hermann and Adolf were invited by the East India company to make an expedition for magnetic and other scientific observations in India; and they sailed from Southampton, Sept. 20, 1854, in company with their brother Robert, reaching Bombay Oct. 26. The most important result to magnetic science was the discovery that the isodynamic lines, which run due E. with little variation from the Arabian sea to the Indian archipelago, are violently deflected in central and southern India, and make a sharp southward curve. On March 25, 1855, Adolf and Robert started for the Himalaya mountains. After examining the glacier of Milum, more than 10 m. long and 3,000 ft. broad, they entered Thibet, and investigated the glaciers of Ibi-Gamin, one of its highest mountains, ascending to an elevation of 22,260 ft. Returning, the three brothers explored the country in different directions, and met at Simla in the spring of 1856. They set out together for new researches in the Himalaya, but soon took different courses, Adolf reaching Lanskar in Thibet on June 26, while his brothers proceeded across the Karakorum and Kuenlun ranges. They met at Serinagur, separated once more, and again came together on Nov. 17 at Rawal-Pindi. Robert then returned to Europe by way of Mooltan, Bhooj, and Bombay, and Hermann by way of Nepaul and Calcutta. Adolf decided to pursue his researches a year longer in Thibet and Turkistan, and proceeded to Kashgar, whence he intended to penetrate into Siberia, but was slain there, for some unknown reason, by the inhabitants. His journal, containing 135 pages of closely written notes, was recovered in September, 1861, by Lord William Hay, civil commissioner in Cashmere. The whole extent of the travels of the brothers Schlagintweit was about 18,000 miles. Hermann and Robert arrived safely in Berlin, and settled at Jägersburg near Forchheim, where they have deposited their valuable collections of about 2,000 minerals and fossils, a large herbarium, zoological and ethnographical specimens, embracing 275 casts of the faces and 37 of the hands and feet of the tribes which they visited, and an atlas of 750 original views. Re-

ports of their travels were published during their absence in the principal geographical journals of Europe. The surviving brothers are preparing a complete narrative in English entitled "Results of a Scientific Mission to India and High Asia, undertaken between the Years 1854 and 1858; with an Atlas of Panoramas, Views, and Maps." Five volumes of this work have been published: the first giving astronomical determinations of latitudes and longitudes, and magnetic observations (Leipsic, 1861); the second, the general hypsometry of India, the Himalaya, and western Thibet, edited by Robert (1862); the third, a route book, with geographical glossary, edited by Hermann (1863); and the fourth and fifth giving the meteorology and physical conditions of India (1866 and 1873). Hermann, who received in 1864 from the emperor Alexander II. the surname of Sakünlünski (Transkuenlunian), is now (1875) writing an elaborate work based on the results of his travels and those of his brothers, under the title of *Reisen in Indien und Hochasien*, of which 4 vols. have appeared (Jena, 1869-'74). Robert published in 1869 a collection of poems from various German poets, entitled *Poetische Bilder aus allen Theilen der Erde*; and after extended travels on the American continent, he wrote *Die Pacific-Eisenbahn in Nordamerika* (1870), and *Californien, Land und Leute* (1871).—EDUARD, another brother (born March 8, 1831, died in the battle of Kissingen, fighting in the Bavarian army, July 10, 1866), published a work based on his observations in the Spanish-Moroccan campaign of 1859-'60, entitled *Der spanisch-marokkanische Krieg* (Leipsic, 1863).—EMIL, a fifth brother (born July 7, 1835), has devoted himself to oriental studies, and written "Buddhism in Tibet" (in English, Leipsic, 1863), *Die Gottesurtheile der Indier* (Munich, 1866), and *Die Könige von Tibet, von der Entstehung königlicher Macht in Yärlung bis zum Erlöschen in Ladák* (or about 50 B. C. to 1834 A. D.), published by the royal Bavarian academy in 1866.

SCHLATTER, Michael, a Swiss missionary, born in St. Gall, July 14, 1716, died near Philadelphia in October, 1790. He was educated at St. Gall, became a clergyman, and in 1746 offered himself to the synods of North and South Holland as a missionary to the German Reformed emigrants in Pennsylvania. From 1746 to 1751 he was pastor of the Reformed churches of Philadelphia and Germantown, and organized churches among the scattered Germans in Pennsylvania, New Jersey, Maryland, and Virginia. He effected the organization of the synod of the German Reformed church in America in September, 1747. In 1751 he revisited Europe, and secured the services of six other ministers for the American churches. In 1757 he accompanied an expedition to Nova Scotia against the French as chaplain. When the revolution broke out he espoused the cause of the colonists, and was imprisoned in 1777.

SCHLEGEL. I. August Wilhelm von, a German scholar, born in Hanover, Sept. 5, 1767, died in Bonn, May 12, 1845. He was a son of the poet and clergyman Johann Adolf Schlegel, and studied at Göttingen, at first theology and afterward philology under Heyne. He had successfully cultivated poetry from his earliest boyhood, which led to his friendship with Körner, and he is said to have been the first to compose German sonnets. After three years' residence at Amsterdam as private tutor, he settled in Jena, where he became professor, and joined his brother Friedrich in writing essays which opened the era of the romantic school of literature. Having separated from his wife, a daughter of Michaelis, he removed in 1802 to Berlin, where he lectured on literature and the fine arts. In 1805 he accompanied Mme. de Staël in her travels. In 1808 he delivered at Vienna his celebrated lectures on dramatic art, which reveal his immense admiration for Shakespeare. They were published in 3 vols. (Heidelberg, 1809-'11), and several times translated into English. Visiting Stockholm in 1812, he became secretary to Bernadotte, the future king of Sweden. In 1815, after the second occupation of Paris by the allies, he joined Mme. de Staël, and remained with her till her death in 1817. From 1819 to the end of his life he was professor of history at Bonn. His second marriage in 1819, with a daughter of Paulus of Heidelberg, resulted like the first in a separation. His literary activity began at Jena, where he wrote for Schiller's *Horen* and other periodicals, edited in conjunction with his brother Friedrich the *Athenäum*, and began his translation of the plays of Shakespeare, of which he rendered 17, the rest being prepared by Dorothea Tieck, under the supervision of her father, and by Count Baudissin. In 1801 he published with his brother *Charakteristiken und Kritiken* (2 vols.), which was followed by his translations of Calderon's five principal plays (*Spanisches Theater*, 2 vols., 1803-'9), and of Spanish, Italian, and Portuguese poetry (*Blumensträuße der italienischen, spanischen und portugiesischen Poesie*, 1804). At the suggestion of Mme. de Staël he published in French in 1807 *Comparaison de la Phèdre d'Euripide avec celle de Racine*, which attracted much attention and aroused much indignation in France. In his *Poetische Werke* (2 vols., 1811) are contained his best poems, and in his *Kritische Schriften* (2 vols., 1828) some of his most profound æsthetical disquisitions. He was also remarkable as an oriental scholar, and as the first in Germany to master Sanskrit. His writings are comprised in his *Sämmtliche Werke* (12 vols., 1846-'7), *Œuvres écrites en français* (3 vols., 1846), and *Opuscula Latina* (1848), the last including his translation of the *Ramayana* and other contributions to Sanskrit literature. II. Friedrich Karl Wilhelm von, a German author, brother of the preceding, born in Hanover, March 10, 1772, died in Dresden, Jan.

12, 1829. He went to Leipsic to qualify himself for commerce, but soon entered the university of Göttingen, and completed his studies at Leipsic. In 1800 he established himself as *Privatdozent* of philosophy in Jena, and subsequently lectured also in Paris. Having with his wife, a daughter of Moses Mendelssohn, joined the Catholic church, he went in 1808 to Vienna, and in the following year accompanied the archduke Charles on the battle field as a secretary, issuing patriotic proclamations against Napoleon. Subsequently he was secretary of the Austrian embassy at Frankfort till 1818, when he returned to Vienna and resumed his lectures there, and in 1828-'9 lectured in Dresden. He shared with his brother and Tieck in the leadership of the romantic school, and was especially remarkable as a critic and thinker of great originality. His principal works are: *Griechen und Römer* (1797); *Geschichte der Poesie der Griechen und Römer* (1798); *Lucinde* (1799), a novel of which only one volume was published on account of its voluptuous character; *Alarcos*, a tragedy (1802); *Ueber die Sprache und Weisheit der Inder* (1808); *Vorlesungen über die neuere Geschichte* (1811); *Geschichte der alten und neuen Literatur* (2 vols., 1815); *Philosophie der Geschichte* (2 vols., 1829); and *Philosophie der Sprache* (1830). His works were collected in 15 vols. (1822-'46). He also published several works written by his wife. His "Lectures on Modern History," "Philosophy of History," "Philosophy of Life and Philosophy of Language," and other works, have been translated into English.

SCHLEICHER, August, a German philologist, born in Meiningen, Feb. 19, 1821, died in Jena, Dec. 6, 1868. He studied theology and comparative philology at Leipsic and Tübingen, and graduated at Bonn as doctor of philosophy in 1846. In 1850 he became professor at Prague, and in 1857 at Jena. He ranked next to Bopp in comparative philology, and was distinguished in the Indo-Germanic and particularly in the Slavo-Lettic group of languages. His works include *Zur vergleichenden Sprachengeschichte* (2 vols., Bonn, 1848-'50, vol. ii. entitled *Die Sprachen Europa's*); *Formenlehre der kirchenslavischen Sprache* (1853); *Handbuch der litauischen Sprache* (2 vols., Prague, 1856-'67); and *Compendium der vergleichenden Grammatik der indogermanischen Sprachen* (Weimar, 1862; 3d ed., 1871; English translation by H. Bendall, part i., "Phonology," London, 1874).

SCHLEIDEN, Matthias Jakob, a German botanist, born in Hamburg, April 5, 1804. He was professor of botany at Jena from 1839 to 1862, and of vegetable chemistry and anthropology at Dorpat in 1863-'4, subsequently residing at Dresden. His principal works are: *Grundzüge der wissenschaftlichen Botanik* (2 vols., Leipsic, 1842-'3; 4th ed., 1861; translated into English by Dr. Lankester, London, 1849); *Die Pflanze und ihr Leben* (6th ed.,

Leipsic, 1864; translated by Prof. Henfrey, London, 1848); *Baum und Wald* (1870); and *Die Rose* (1873).

SCHLEIERMACHER, Friedrich Daniel Ernst, a German theologian, born in Breslau, Nov. 21, 1768, died in Berlin, Feb. 12, 1834. His father was a Reformed minister, and chaplain of a Prussian regiment in Silesia. In 1788 he was placed in the educational establishment of the Moravians at Niesky, Upper Lusatia, and in 1785 in the Moravian college at Barby. He entered the university of Halle in 1787, where he lived in the house of his uncle, Prof. Stubenrauch. He attended the lectures of Semler and Wolf, made himself acquainted with modern languages and mathematics, and studied Spinoza, Kant, Fichte, and Jacobi. After a two years' course he left the university without a fixed system of religious opinions. In 1790 he passed the examination for license, and became private tutor in the family of Count Dohna, where he spent three years. In 1794 he took orders and became assistant to his uncle at Landsberg on the Warta. From 1796 to 1802 Schleiermacher was chaplain at the Charité hospital in Berlin; and during these six years he identified himself temporarily with the so-called romantic school of poetry. In 1799 he published *Reden über die Religion an die Gebildeten unter ihren Verächtern* (new ed., Leipsic, 1867), which marks the transition of German theology from speculation to the restoration of positive faith. His piety, however, was strongly tinctured with the pantheism of Spinoza. His *Monologen* (1800) is a description of the ethical ideal which floated before his mind, and was evidently influenced by the subjective idealism of Fichte. In 1802 he removed for two years to Stolpe in Pomerania as court preacher. There began his translation of Plato, which he had projected with Friedrich Schlegel in Berlin. Its partial completion in 6 vols. (1804-'28) gives him a place among the best Greek scholars in Germany. His *Grundlinien einer Kritik der bisherigen Sittenlehre*, which opened a new path in moral philosophy, belongs to the same period (1803). In 1804 he became extraordinary professor of philosophy and theology in Halle. After the temporary suspension of this university in 1806 he spent some time on the island of Rügen, then returned to Berlin as minister of Trinity church, and married the widow of his intimate clerical friend Willich (1809). When the university of Berlin was founded in 1810, he was elected its first theological professor, and continued in this post, combining with it his pastoral labors in Trinity church, during the rest of his life. In connection with his colleague Neander, his former pupil in Halle, he attracted students from all parts of Germany and Switzerland. Wilhelm von Humboldt says that Schleiermacher's speaking far exceeded his power in writing, and that his strength consisted in the "deeply penetrative character of his words, which was free from

art, and the persuasive effusion of feeling moving in perfect unison with one of the rarest intellects." He never wrote out his sermons, except the text, theme, and a few heads, but allowed them to be taken down during delivery and published after he had revised them. During the most critical and depressed period in the history of Prussia, he exerted a powerful influence to stir up in all classes of society those patriotic feelings which resulted in the war of deliverance and the final emancipation of Germany from French rule. He adhered to his liberal political principles during the period of reaction in favor of absolutism, which set in after the fall of Napoleon and the congress of Vienna, and subjected himself to strong suspicion in high quarters. He assisted in the union of the Lutheran and Reformed confessions in Prussia at the tercentennial celebration of the reformation (1817), and defended it, although he regarded himself as belonging rather to the Reformed type of Protestantism, and advocated in his own way even the Calvinistic scheme of a double predestination as subservient to an ulterior design of a final universal salvation. He favored strongly the introduction of the presbyterian and synodical form of government. He was one of the compilers of the new Berlin hymn book (1829), which opened the way for a hymnological reform in all parts of Germany. —Schleiermacher was small of stature, and slightly deformed by a humpback; but his face was noble, earnest, sharply defined, and highly expressive of intelligence and kindly sympathy; his eye keen, piercing, and full of fire; his movements quick and animated. His mind retained its vitality and freshness to the last. His productions, including the posthumous publications from his lectures, embrace philosophical ethics, dialectics, psychology, politics, pedagogics, church history, hermeneutics, Christian ethics, dogmatics, practical theology, sermons, and a large number of philosophical, exegetical, and critical essays. The Old Testament alone was excluded from his lectures. His literary remains were intrusted to his friend and pupil Dr. Jonas, and from them as well as from his published writings and numerous manuscripts of students a complete collection of his works has been published in three divisions, respectively entitled *Zur Theologie, Predigten, and Zur Philosophie*, including his lectures on psychology (1862) and *Das Leben Jesu* (1864); the whole publication embraces 81 volumes (1835-'64). His correspondence with J. Chr. Gass was edited in 1852 by W. Gass, and that with other friends appeared under the title *Aus Schleiermacher's Leben* (4 vols., 1853-'62). His autobiography, extending only to 1794, was first published in 1851 in Niedner's *Zeitschrift für historische Theologie*. His philosophical and theological views have been discussed by Braniss (1822), Delbrück (1827), Baumgarten-Crusius (1834), Rosenkranz (1836), Strauss (1839), Neander, Twe-

sten, Baur, and others. Among his biographers are Auberlen (1859), K. Schwartz (1861), Elisa Maier (1863), Dilthey (1867 *et seq.*), and Schenkel (1868). See also *Schleiermacher's Reden über die Religion und ihre Nachwirkungen auf die evangelische Kirche Deutschlands*, by Albrecht Ritschl (Bonn, 1874).

SCHLEIZ. See REUSS.

SCHLESTADT. See SCHLETTSTADT.

SCHLESWIG, or Sleswick (Dan. *Slesvig*). **I.** Formerly an independent duchy governed by the king of Denmark, now the N. part of the Prussian province of Schleswig-Holstein. It is bounded N. by Jutland, from which it is partly separated by the Konge Aa, E. by the Little Belt and the Baltic, S. by Holstein, from which it is separated by the Eider river and the Schleswig-Holstein canal, and W. by the North sea; extreme length 90 m., general breadth about 40 m.; area, 3,529 sq. m.; pop. in 1871, 409,907. (See SCHLESWIG-HOLSTEIN.)—Since the time of Charlemagne Schleswig has been a disputed possession between the Germans and the Danes. A margraviate erected here by Henry I. of Germany about 934, and reorganized by Otho the Great in 948, was yielded up to Canute the Great in 1027, when the Eider was agreed upon as the boundary between the two countries. Thenceforward Schleswig was usually bestowed upon the younger princes of the Danish reigning family. King Waldemar II. (1202-'41) invested with it his younger son Abel, whose descendants, closely allied with the counts of Holstein of the Schauenburg house, but usually hostile to the Danish kings, ruled it till 1375. During this period the foundation was laid for the union of the two territories, and in 1326 the so-called constitution of Waldemar was adopted, according to which Schleswig was never again to be united with Denmark under the same lord. After the extinction of Abel's line, the counts of Holstein laid claim to Schleswig under several treaties, and in 1386 Gerhard VI. received it as a Danish fief. Although Holstein was a fief of the empire, the history of the two countries is from this time united.

II. A city of Prussia, in the province of Schleswig-Holstein, formerly capital of the duchy of Schleswig, at the head of a shallow bay called the Schlei or Sley, about 20 m. from the Baltic, and 69 m. N. N. W of Hamburg; pop. in 1871, 13,850. It is almost surrounded by water, and is divided into three parts, the Altstadt, chiefly inhabited by fishermen, the Lollfuss, and Friedrichsburg. It has a cathedral with many monuments. Woollen goods, leather, lace, and china are made. The harbor is accessible to small vessels. Schleswig was in existence in 808, and for nearly 600 years it was an important commercial city. It declined from the gradual filling up of its harbor.

SCHLESWIG-HOLSTEIN, a province of Prussia, formed in 1866, and consisting of the former duchies of Schleswig and Holstein, bounded N. by Denmark, E. by the Baltic, Lübeck,

and Lauenburg, S. by the province of Hanover, from which it is separated by the Elbe, and W. by the North sea; area, 6,766 sq. m.; pop. in 1871, 995,873, chiefly Protestants. The inhabitants are a mixture of various races. In N. Schleswig Danish is spoken by about 145,000 people, who occupy nearly half of the former duchy of Schleswig. In S. Schleswig and Holstein nearly all the inhabitants speak German. The Frisian dialect is still spoken in some of the western parishes, but it is not used in either church or school. The district between and E. of the towns of Schleswig and Flensburg is known as the territory of the Angles. The province constitutes only one administrative district, called Schleswig. The principal towns are Altona, Kiel (the capital), Rendsburg, and Glückstadt in Holstein, and Schleswig and Flensburg in Schleswig. The chief rivers, besides the Elbe, are the Eider, which separates Schleswig from Holstein, the Trave, and the Stör, an affluent of the Elbe. A number of islands lie opposite the W. coast of Schleswig, of which Römö, Sylt, and Föhr are the most important. The islands of Alsen in the Little Belt and Femern N. E. of Holstein also belong to the province. The surface is mainly level; in the interior of Schleswig there is a slightly elevated sandy ridge covered with heath, which increases in height toward the north. The soil of Holstein is very fertile, and produces wheat, buckwheat, potatoes, hops, hemp, flax, and wood. The soil in the interior of Schleswig is light and stony; the W. side is bordered by a strip of rich marsh land, and artificial dikes and sluices are necessary to prevent its being overflowed. The province is noted for its fine horses, which are famous for heavy cavalry service and are exported in considerable numbers. The manufactures are not important; only Neumünster in Holstein can be called a manufacturing town. (See HOLSTEIN.)—In 1386 the counts of Holstein received Schleswig as a Danish fief. Their line becoming extinct, the estates of Schleswig-Holstein in 1460 elected Count Christian of Oldenburg to be their sovereign, who had in 1448 been chosen king of Denmark. It was stipulated that the duchies "should for ever remain together undivided," and the estates reserved the right to choose at any time a successor from among his descendants. The agreement to maintain the integrity of Holstein was soon broken, and in 1490, with the consent of the estates, two sovereign houses were founded. These were united again under Frederick I., but in 1544 three sovereign houses were founded. Since 1580 there have been three main branches of the family of Schleswig-Holstein: the royal Danish, called the Holstein-Glückstadt; that of Holstein-Gottorp, of which since 1762 the czar of Russia is the head; and the Holstein-Sonderburg, which had no territorial authority. In 1616 the estates yielded their right of election, and the law of succession became that

of primogeniture, with reversion to the collateral branches. In 1773 the future emperor Paul I., as duke of Holstein-Gottorp, ceded all his possessions and claims in Schleswig-Holstein to the king of Denmark, in exchange for the principality of Oldenburg, which he transferred to the youngest branch of the Holstein-Gottorp family. The ancient constitution of Schleswig-Holstein had since the 17th century fallen into abeyance, and in 1802-'6 the estates were formally abolished. In 1815 the king of Denmark had to enter the German confederation as duke of Holstein, and in 1823 the inhabitants of that province appealed to the German diet for the constitution of 1460, without effect; but in 1834 chambers were erected both for Schleswig and for Holstein. But still the repressive measures of the government, and a persistent effort to bring the German language into disuse in the churches, schools, and courts, created discontent. The Salic law had never been abolished in Schleswig or Holstein, and the royal house in the male line was about to become extinct when on July 8, 1846, appeared a proclamation of the king, extending the Danish laws of succession to all his dominions except a part of Holstein, at the same time expressing the intention of including even this in time. The collateral branches of the reigning family, the estates of the duchies, and the German diet protested; but on March 24, 1848, Frederick VII. proclaimed the incorporation of Schleswig with Denmark. This was the beginning of a three years' war, in which the duchies contended for their independence, and were for a time aided by Prussia. (See DENMARK.) In January, 1851, Austria and Prussia jointly intervened, disbanded the Schleswig-Holstein army, and on Feb. 18, 1852, surrendered Holstein to Denmark. At the London conference of May, 1852, the great powers and Sweden fixed upon Prince Christian of Schleswig-Holstein-Sonderburg-Glücksburg as the next king. The other branches of the prince's family residing in Denmark renounced their claims in Prince Christian's favor, but those residing in Schleswig-Holstein did not. Neither the estates of the duchies nor the German diet became a party to this agreement. In 1854 constitutions were granted to both Schleswig and Holstein; but they were not satisfactory to the people, and in November, 1863, the parliament formally incorporated Schleswig with Denmark. In the same month the king died, and, in accordance with the London treaty, the prince of Sonderburg-Glücksburg ascended the throne as Christian IX. The prince of Schleswig-Holstein-Sonderburg-Augustenburg, whom the duchies regarded as the rightful heir, proceeded to Kiel to assume the government. In the mean time the German diet had declared the treaty of London broken by Denmark, and an Austro-Prussian army entered Holstein. After severe fighting the Danes were driven out of Schleswig, and even Jutland was occupied by

German troops. England attempted in vain to mediate, a second London conference came to nothing, and the Danes were completely subdued. At the treaty of Vienna, Oct. 30, 1864, Christian IX. renounced all his claims to Schleswig-Holstein, and also to Lauenburg. The convention of Gastein, Aug. 14, 1865, assigned the occupation of Holstein to Austria and of Schleswig to Prussia. After the war of 1866 both duchies came under Prussian rule, and were shortly after made a province of the Prussian monarchy. The article in the treaty of Prague between Austria and Prussia, providing for a restoration of Danish-speaking Schleswig to Denmark should the people vote for it, has thus far (1875) been disregarded. (See DENMARK.)—See Droysen and Samwer, *Die Herzogthümer Schleswig-Holstein und das Königreich Dänemark* (2d ed., Hamburg, 1850); Lüders, *Denkwürdigkeiten zur neuesten schleswig-holsteinischen Geschichte* (4 vols., Stuttgart, 1851-'3); Baudissin, *Geschichte des schleswig-holsteinischen Kriegs* (Hanover, 1862); Rüstow, *Der deutsch-dänische Krieg von 1864* (Zürich, 1864); *Der österreichisch-preussische Krieg gegen Dänemark* (Vienna, 1865); and Möller, *Geschichte Schleswig-Holsteins* (2 vols., Hamburg, 1865).

SCHLETTSTADT (Fr. *Schelestadt* or *Schlestadt*), a town of Germany, in Lower Alsace, on the left bank of the Ill, 25 m. S. S. W. of Strasbourg; pop. in 1871, 9,307, chiefly Roman Catholics. It contains several fine mediæval churches, a college, a public library, and a Catholic normal seminary opened in 1872. Leather, cotton goods, potash, and many other articles are manufactured; and there is trade in wine, tobacco, rape seed, hemp, and flax. Schlettstadt was a town in the 8th century, having been founded on the site of one destroyed by Attila, and was fortified and became a free imperial city in the 13th century. Agricola established a school here. It was taken by the Swedes in 1632, was annexed to France in 1648, and subsequently became the capital of an arrondissement in the department of Bas-Rhin. The fortifications, designed by Vauban, commanded the railway lines and the military road to Belfort and Besançon. The Germans captured it after a siege in October, 1870, and subsequently demolished the fortifications.

SCHLEY, a S. W. county of Georgia, drained by branches of Flint river; area, about 200 sq. m.; pop. in 1870, 5,129, of whom 2,851 were colored. The chief productions in 1870 were 3,889 bushels of wheat, 88,053 of Indian corn, 19,626 of sweet potatoes, 1,540 lbs. of rice, 3,657 bales of cotton, and 6,672 gallons of sorghum molasses. There were 317 horses, 621 mules and asses, 2,531 cattle, 486 sheep, and 4,371 swine. Capital, Ellaville.

SCHLIEMANN, Heinrich, a German traveller, born at Kalkhorst, Mecklenburg-Schwerin, in 1822. His father was poor, and placed him at the age of 14 in a grocer's store in Fürsten-

berg, where he remained for more than five years. He then obtained employment in a mercantile house in Amsterdam, and devoted his leisure hours to the acquisition of languages, learning very rapidly, as he relates, to speak and write English, French, Dutch, Spanish, Italian, and Portuguese, in addition to Latin, which he had learned in his childhood. His learning Russian was the foundation of his fortune. In the beginning of 1846 he was sent as an agent to St. Petersburg, where he established a business of his own, which within a few years brought him considerable wealth. In 1854 he mastered Swedish and Polish; and in 1856 he learned modern Greek, with the help of two Greek friends, in six weeks, and three months more sufficed him to learn enough of classical Greek to understand the ancient writers. He now devoted two years exclusively to the classics, reading the Iliad and Odyssey several times. In 1858-'9 he travelled in Sweden, Denmark, Germany, Italy, Egypt, and Syria, and learned Arabic. In 1863 he retired from business with the intention of exploring the Troad, but in 1864 he was induced to make a journey around the world, which occupied two years. He then settled in Paris, where he published in 1869 *Ithaque, le Péloponnèse et Troie* (German ed., Leipsic, 1869), giving an account of his travels in 1868 in Corfu, Cephalonia, Ithaca (where he supposed he had discovered genuine remains of the home of Ulysses, as seen by Homer), the Peloponnesus, and the plain of Troy, the result of studies of the so-called Cyclopean works of Argolis, and an examination of the topography of the Iliad. In the beginning of 1870 he returned to the Troad, accompanied by his wife, a Greek lady, and spent the seasons of 1871-'3 in excavating the plateau of Hissarlik, which he considers to have been the site of Troy. (See TROY.) His book, *Trojanische Alterthümer* (1874), a sort of diary of the progress of the excavations, has been translated into several languages; the English version, edited by Dr. Philip Smith (London, 1875), gives a selection of illustrations drawn from the large *Atlas Trojanischer Alterthümer*, consisting of 218 photographs of his discoveries, with explanatory text, which Schliemann published soon after. He produced much irritation at Constantinople by failing to send, as promised, half of the objects he discovered at Hissarlik to the imperial Ottoman museum. In 1874 he obtained from the Greek government permission to demolish at his own expense the Venetian tower in the acropolis of Athens, which covers about 1,600 sq. ft. of the Propylæa. But the permission was cancelled, probably on account of his pending suit with the Turkish government, and Schliemann thereupon induced the archaeological society of Athens to carry on the excavations for him.

SCHLOSSER, Friedrich Christoph, a German historian, born at Jever, Oldenburg, Nov. 17,

1776, died in Heidelberg, Sept. 23, 1861. He studied at Göttingen, and from 1817 till his death was professor of history at Heidelberg. His principal works are: *Geschichte des 18. Jahrhunderts*, continued to the overthrow of Napoleon I. (8 vols., 1823-'46; 5th ed., 1864-'6; English translation, with notes by D. Davison, "History of the Eighteenth Century," 8 vols., London, 1843-'52); *Weltgeschichte in zusammenhängender Erzählung* (9 vols., 1817-'24; 2d ed., 1839-'41); *Universalhistorische Uebersicht der Geschichte der alten Welt und ihrer Cultur* (3 vols., 1826-'34); and *Weltgeschichte für das deutsche Volk*, with the assistance of Kriegk (19 vols., 1842-'54; new ed., 18 vols., 1870-'74).

SCHLÖZER. I. August Ludwig von, a German historian, born at Gaggstedt, Württemberg, July 5, 1735, died in Göttingen, Sept. 9, 1809. He studied in Wittenberg and Göttingen, and became a private teacher in Sweden, where he published a work in Swedish on the history of trade and commerce (Stockholm, 1758). In 1759 he returned to Göttingen to study medicine, but in 1761 went with the Russian historiographer Müller to St. Petersburg, where he became a teacher at the academy, and was professor of history from 1765 to 1767, when he assumed the chair of political sciences at Göttingen. He wrote on northern and universal history, and extensively on politics, and translated Nestor's Russian chronicles to A. D. 980 (5 vols., 1802-'9). **II. Kurd von**, a German author, grandson of the preceding, born in Lübeck, Jan. 5, 1822. He was German minister in Mexico from 1869 to 1871, and subsequently in Washington. His works include *Geschichte der deutschen Ostseeländer* (3 vols., Berlin, 1850-'53); *Verfall und Untergang der Hansa* (1853); and *Friedrich der Grosse und Katharina II.* (1859).

SCHMALKALDEN. See SMALCALD.

SCHMID, Leopold, a German theologian, born in Zürich, June 9, 1808, died in Giessen, Dec. 20, 1869. He studied at Tübingen and Munich, became in 1839 professor of theology at Giessen, and in 1843 professor of philosophy. In February, 1849, he was nominated to the vacant see of Mentz, but Bishop Ketteler was substituted in his stead by the pope. In his principal work, *Der Geist des Katholicismus, oder Grundlegung der christlichen Irenik* (2 vols., Giessen, 1848-'50), he advocated the return of the Roman Catholics to the doctrines and practices of the primitive church, and urged the adoption of a broader spirit of charity in dealing with Protestant churches. In *Ultramontan oder katholisch?* (1867), he proposed as an axiom of state policy to refuse to treat the Roman Catholic hierarchy as the representatives of a distinct religious community, so long as they would not acknowledge the specific claims of the evangelical religion. He also attempted to reconcile science and faith in his *Grundsätze der Einleitung in die Philosophie* (1860) and *Das Gesetz der Persönlichkeit*

(1862).—See Schröder and Schwarz, *Leopold Schmid's Leben und Denken* (Leipsic, 1871).

SCHMIDT, Heinrich Julian, a German author, born in Marienwerder, March 7, 1818. He studied at Königsberg, and became a teacher and journalist in Berlin. Since 1863 he has devoted himself exclusively to literature. His principal works are: *Geschichte der Romantik im Zeitalter der Reformation und Revolution* (2 vols., Leipsic, 1850); *Geschichte der deutschen Literatur seit Lessing's Tod* (5th ed., 3 vols., 1865-'7); and *Bilder aus dem geistigen Leben unserer Zeit* (1870-'71; 2d series, 1873).

SCHNAASE, Karl, a German author, born in Dantzic, Sept. 7, 1798, died in Wiesbaden, May 21, 1875. He studied law, and held judicial offices in various localities from 1819 to 1857. In 1858 he established the periodical *Das christliche Kunstblatt*, and edited it with Grüneisen in Stuttgart and Schnorr von Karolsfeld in Dresden. After spending several years in Rome, he settled in 1867 in Wiesbaden. His principal works are: *Niederländische Briefe* (Stuttgart, 1834), and *Geschichte der bildenden Künste* (7 vols., Düsseldorf, 1843-'64; 2d ed. by Lützwow and Friedrichs, 1866 *et seq.*).

SCHNEIDER, Eugène, a French politician, born in Nancy in April, 1805, died in Paris, Nov. 27, 1875. He and his brother (who died in 1845) became managers of the iron works of Le Creuzot, and he was elected to the chamber in 1845. In 1851 he was minister of agriculture and commerce. In 1852 he was returned to the legislative body, of which he became vice president, and after Morny's death (1865) president, being repeatedly reelected. He was also regent of the bank of France.

SCHNEIDER, Hortense Catherine, a French actress, born in Bordeaux about 1835. She appeared on the stage in her 15th year, and was connected with various theatres in Paris for upward of ten years before she became celebrated in 1864 by her personation of Offenbach's *La belle Hélène*. She achieved still greater triumphs in *La grande duchesse* and similar operas.

SCHNEIDER, Johann Gottlob, a German philologist, born at Collmen, Saxony, Jan. 18, 1750, died in Breslau, Jan. 12, 1822. He studied at Leipsic, and in 1774 assisted Brunk in editing the Greek poets at Strasburg. In 1776 he became professor at Frankfort-on-the-Oder, and in 1811 at Breslau. He published a large critical Greek lexicon (2 vols., 1797-'8; 3d ed., with supplement, 1819-'21), annotated editions of many Greek authors, and also various works on natural history.

SCHNETZ, Jean Victor, a French painter, born in Versailles, May 15, 1787, died in Paris, March 15, 1870. He studied under David, Regnault, and Gros, and was director of the French academy in Rome for many years. He executed numerous historical, religious, and genre pictures; the most popular are: "The Gypsy foretelling the Future of Sixtus V.," "Christ calling little Children unto Him," "St. Gene-

viève," "Jeremiah," "The Capuchin Physician," "The Monk engaged in Prayer," and a pastoral scene from the vicinity of Rome.

SCHNORR VON KARLSFELD, Julius, a German painter, born in Leipsic, March 26, 1794, died in Dresden, May 24, 1872. He was the son of the painter Veit Hans Schnorr (1764-1841), and studied under his father, in Vienna, and in Italy. In 1817 he went to Florence and Rome, where Overbeck and Cornelius procured orders for him for frescoes, and he also executed there many oil paintings of religious subjects. In 1827 he became professor at the academy of Munich, and in 1846 removed as professor to Dresden, where he was also director of the picture galleries. He was the founder of a new school in opposition to the unconventional style of Kaulbach, and adhered to the most rigid rules of art. His most celebrated works are the frescoes and paintings of the *Nibelungen*, and his series of encaustic pictures illustrating the history of Charlemagne, Frederick Barbarossa, and Rudolph of Hapsburg, all in the royal palace at Munich; "Luther at the Diet of Worms," also in Munich; and his designs for the windows in St. Paul's cathedral, London. His best known designs for illustrated books are his *Bibel in Bildern* (Leipsic, 1852-'60), and those prepared in conjunction with Neureuther for the *Nibelungenlied*.—His brother LUDWIG FERDINAND (1788-1853), chief director of the Belvedere gallery in Vienna, was a good painter of the romantic school, and executed admirable designs for Goethe's *Faust*.

SCHELCHER, Victor, a French author, born in Paris, July 21, 1804. He early became known as an advocate of free institutions, visited Mexico, the United States, the West Indies, and the East, and the banks of the Senegal, and published *De l'esclavage des noirs et de la législation coloniale* (1833); *Abolition de l'esclavage* (1840); *Les colonies françaises* (1842); *Les colonies étrangères et Haïti* (2 vols., 1843); *Égypte en 1845* (1846); and *L'Histoire de l'esclavage pendant les deux dernières années* (2 vols., 1847). In 1848 he was appointed under-secretary of state for the navy, and at once procured the passage of a law for the abolition of slavery in the French colonies (April 27). He represented Guadeloupe in the constituent and legislative assembly till the *coup d'état* of Dec. 2, 1851, when, after an attempt at armed resistance, he took refuge in London, where he published several works, including a "Life of Handel" in English (1857). Despite successive amnesties, he did not return to Paris until after the downfall of Napoleon III. in 1870. During the siege of Paris he had command of the artillery of the national guard. The commune imprisoned him a few days for attempting to reconcile them with the government. At the general election of Feb. 8, 1871, he was returned in Paris, Martinique, and French Guiana, and took his seat for Martinique.

SCHÖFFER, or *Schoffler*, **Peter**, a German printer, born at Gernsheim, near Darmstadt, about 1480, died about 1503. In early life he was a copyist at Paris, but about 1450 became an assistant in the printing establishment of Faust and Gutenberg in Mentz. He introduced many improvements in the art of printing while in their employ, and after their separation in 1455 became a partner of Faust, whose daughter Christine he afterward married. The first book on which his name appears is the celebrated Psalter, August, 1457, reprinted in 1459. This was followed by a number of other works, all remarkable for their beauty of impression and clearness of type. In 1463 he accompanied his father-in-law to Paris to establish a depot for the sale of their books. After the death of Faust about 1466, Schöffler carried on the business alone, and was succeeded by his son Johann. The latter printed chiefly religious works between 1503 and 1531. A monument to Peter Schöffler was erected at Gernsheim in 1836.

SCHOFIELD, **John McAllister**, an American soldier, born in Chautauqua co., N. Y., Sept. 29, 1831. He graduated at West Point in 1853, and in 1860 became professor of physics in the Washington university at St. Louis. On Nov. 21, 1861, he was made brigadier general of volunteers, five days afterward brigadier general of Missouri militia, and on Nov. 29, 1862, major general of volunteers. He bore a part in the principal engagements of the Atlanta campaign, and after the capture of Atlanta, Sept. 1, 1864, was placed under Gen. Thomas in command of the forces which opposed the movement of Gen. Hood toward Nashville. He commanded at the battle of Franklin, Nov. 30, for which he was made brigadier general in the regular army, and afterward brevet major general; and he led a corps in the subsequent engagements before Nashville, Dec. 15, 16, and in the pursuit of the remnant of Gen. Hood's army. As commander of the department of North Carolina he took possession of Wilmington, Feb. 22, 1865; fought successfully at Kingston, March 8-10; and then advanced to Goldsboro', where on March 22 he united with the army of Gen. Sherman. During the political complication of 1868 Gen. Schofield was appointed secretary of war, May 30. In March, 1869, he was assigned to command the department of the Missouri, and in April, 1870, the division of the Pacific.

SCHOHARIE, an E. county of New York, drained by Schoharie and Catskill creeks; area, 675 sq. m.; pop. in 1870, 33,340. A branch of the Catskill mountains occupies the S. and W. part, and a ridge called the Helderberg mountains extends along the E. border. Iron ore, limestone, and sandstone are found, and there are sulphur springs in the northwest. It is traversed by the Albany and Susquehanna and two or three short railroads. The chief productions in 1870 were 66,440 bushels of wheat, 82,452 of rye, 113,097 of Indian corn, 750,091

of oats, 40,127 of barley, 231,230 of buckwheat, 329,488 of potatoes, 95,520 tons of hay, 126,903 lbs. of wool, 2,190,668 of butter, 112,421 of cheese, 1,610,457 of hops, 84,811 of flax, 69,986 of maple sugar, and 16,998 of honey. There were 8,634 horses, 23,256 milch cows, 15,087 other cattle, 29,293 sheep, and 6,200 swine; 6 manufactories of agricultural implements, 4 of brooms, 10 of carriages and wagons, 2 of cement, 5 of cheese, 12 of cooperage, 1 of cotton goods, 10 of iron castings, 15 of leather, 3 of paper, 12 flour mills, and 10 saw mills. Capital, Schoharie.

SCHOLASTICISM. See **PHILOSOPHY**, vol. xiii., p. 439.

SCHOLTEN, **Johannes Hendrik**, a Dutch theologian, born at Vleuten, near Utrecht, Aug. 17, 1811. He was minister at Meerkerk from 1838 to 1840, and afterward professor of theology at the Athenæum of Franeker till 1843, when he was transferred to the university of Leyden. He is the founder of the new school of Dutch Protestant theology, and claims for it the utmost independence in the application of scientific principles. His works include *Geschiedenis der Godsdienst en wijsbegeerte* (Leyden, 1853; French translation by Réville, *Manuel d'histoire comparée de la philosophie et de la religion*, Paris, 1861); *De leer der hervormde kerk in hare grondbeginselen* (2 vols., Leyden, 1848-'50; 4th ed., 1861-'2); *De vrye wil critisch onderzoek* (1859); *Over de oorzaken van het hedendaagsche materialisme, and Het critisch standpunt van Mr. C. W. Opzoomer* (Amsterdam, 1860); *Het evangelie naar Johannes* (Leyden, 1864; German translation by Lang, Berlin, 1864); *De oudste getuigenissen aangaande de schriften des Nieuwe Testaments* (Leyden, 1866; German translation by Manchot, Bremen, 1867); *De evangelien naar Mattheus en Marcus* (1867); and *Supernaturalisme in verband mit Bijbel, christendom en protestantisme* (1867).

SCHOMBERG, **Frederick Hermann**, duke of, an English soldier of German origin, born in Heidelberg about 1616, fell in battle, July 1 (N. S. 12), 1690. He was a son of the German count Johann Meinhardt von Schomberg, and his mother was an English lady, a daughter of Sir Edward Sutton, Lord Dudley. In early life he served in the armies of the Netherlands and other countries, and in 1650 entered that of France. As commander in Portugal he compelled Spain in 1668 to recognize the Portuguese dynasty of Bragança. In 1675 Louis XIV. made him marshal for his services in Catalonia, and in the following two years he forced the enemies of France to raise the siege of Maestricht and Charleroi. He left the French army on the revocation of the edict of Nantes in 1685, and sought employment from other governments. The prince of Orange, under whom he had formerly served, appointed him as his second in command on his departure for England in 1688, and in 1689 created him duke of Schomberg in the Eng-

lish peerage, and made him master of the ordinance, while parliament granted him £100,000. He was sent to Ireland, and in 1690 took a heroic part in the battle of the Boyne, in which he lost his life.—His second son Meinhardt became duke of Leinster, and succeeded his brother Charles as third duke of Schomberg. He died without male issue in 1719, when all the titles became extinct.

SCHOMBERG, Henri de, count, a French soldier, born in Paris in 1573 or 1575, died in Bordeaux, Nov. 17, 1632. He was descended from the German Schombergs. After holding various high offices he became in 1619 superintendent of finance and grand master of artillery, and assisted in reducing the Protestant strongholds in Languedoc and Guienne. From 1621 to 1624 he was omnipotent as prime minister, and excited the jealousy of Richelieu, who had him displaced, but raised to the rank of marshal. He expelled the English from the island of Ré in 1627, and distinguished himself during the siege of La Rochelle; took Pinerolo in 1630, and forced the duke of Savoy to raise the siege of Casale; in 1632 commanded the army against the insurgents in Languedoc, on Sept. 1 defeated and captured the duke of Montmorency at Castelnaudary, and was made governor of Languedoc. He published *Relation de la guerre d'Italie* (Paris, 1630).—His son CHARLES (1601–56) served under him in Italy and Languedoc, succeeded him as governor of the latter province, defeated the Spaniards at Leucate in 1637, received the rank of marshal, took Perpignan in 1642, and commanded the army which invaded Catalonia in 1648. He acquired the title of duke by his first wife, the duchess of Halluin. His second wife, Marie de Hautefort (1616–91), was a favorite of Louis XIII., and one of the most celebrated women of her day, best known as *maréchale de Schomberg*.

SCHOMBURCK, Sir Robert Hermann, an English traveller, born at Freiburg-on-the-Unstrut, Prussia, June 5, 1804, died at Schöneberg, near Berlin, March 11, 1865. In early life he was for some time partner in a tobacco manufactory in Virginia. In 1830 he went almost penniless to the West Indies, and explored the little island of Anegada, one of the Virgin group. His valuable reports on the dangerous coasts procured him in 1834 from the English geographical society and some botanists the means of exploring British Guiana, where he spent four years. He published "Description of British Guiana, Geographical and Statistical" (London, 1840); "Views in the Interior of Guiana" (1840); and reports to the geographical society, translated into German by his brother Otto, with a preface by Alexander von Humboldt (*Reisen in Guiana und am Orinoco*, Leipsic, 1841). The great *Victoria regia* lily was discovered by him on this journey. From 1841 to 1844 he was at the head of a commission to survey

the frontier between British Guiana and Brazil, and to make further geographical and ethnological investigations. He was joined by his brother Moritz Richard, who published an account of the journey in German (3 vols., 1847–8). Robert was knighted in 1845, and from 1848 to 1857 he was British consul and chargé d'affaires to the Dominican republic, and afterward till 1864 consul general at Bangkok, Siam. Besides the works mentioned, he published "History of Barbadoes" (1847), and "The Discovery of the Empire of Guiana by Sir Walter Raleigh" (1848).

SCHÖNBEIN, Christian Friedrich, a German chemist, born at Metzingen, Würtemberg, Oct. 18, 1799, died in Baden-Baden, Aug. 28, 1868. He was early apprenticed to a manufacturer of chemical products, and was conscripted, but was exempted from military service by the king, who assisted him in completing his education at Tübingen and Erlangen. In 1824–5 he taught chemistry and physics at Keilhau near Rudolstadt. In 1828 he became professor at the university of Basel. In 1839 he discovered the allotropic condition of oxygen known as ozone (see OZONE), and in 1845 he produced gun cotton. His most noteworthy works are: *Das Verhalten des Eisens zum Sauerstoff* (Basel, 1837); *Beiträge zur physikalischen Chemie* (1844); *Ueber die Erzeugung des Ozons* (1844); and *Ueber die langsame und rasche Verbrennung der Körper in atmosphärischer Luft* (1845).—See *Christian Friedrich Schönbein*, by Hagenbach (Basel, 1869).

SCHOOL BROTHERS AND SCHOOL SISTERS, the collective name of numerous associations in the Roman Catholic church, devoted to the education of youth. The first of these associations, the Ursulines, arose in 1537 at Brescia, under the direction of the first Jesuits; the "Sisters of the Congregation of Our Lady" were founded in 1597 by Pierre Fourier; the "Piarists" or "Fathers of the Pious Schools," in the same year; the "Visitation Nuns" in 1610; and the "Brothers of the Christian Schools" in 1679. In 1863 there were in France 58,883 members of sisterhoods employed in teaching, and 3,073 more directing orphan asylums and agricultural or industrial schools, while the total number of school brothers in the same year was upward of 9,000. I. SCHOOL BROTHERS. Under this name we treat solely of those congregations whose members are not priests, the "Fathers of the Pious Schools" being treated under PIARISTS. The following are the most important school brotherhoods: 1. The "Brethren of the Christian Schools," founded in 1679 by Jean Baptiste de la Salle. (See BRETHREN OF THE CHRISTIAN SCHOOLS.) 2. The "Christian Brothers," founded by the Rev. E. Rice at Waterford, Ireland, with their central house and superior general in Dublin, and numerous establishments in Great Britain, Ireland, and the British colonies. 3. The "Brothers Marists" or "Christian Brothers of the Society of Mary," founded

at Bordeaux, France, in 1817, by Abbé Guillaume Joseph Cheminade, approved by Pope Gregory XVI. in 1839, introduced into the United States in 1849 by Archbishop Purcell of Cincinnati, and having in 1874 23 establishments in Ohio, Illinois, New York, Pennsylvania, Maryland, Louisiana, and Texas. 4. The "Lamennaisian Brothers" or "Congregation of Christian Instruction," founded in Brittany in 1820, by Abbé Jean de Lamennais, whose purpose is to teach in the poorest localities. In 1875 they reckoned about 800 members and 150 establishments in France. 5. The "Brothers of the Sacred Hearts of Jesus and Mary," founded in 1821 at Le Puy, France, by Abbé Coindrin. They opened their first house in the United States at Mobile in 1847, and in 1874 had other establishments in Mississippi, New Orleans, Kentucky, and Indiana. 6. The "Xaverian Brothers," founded at Bruges, Belgium, in 1839, by Théodore Jacques Ryken, with a special view to labor for education in the United States. They were first introduced into Louisville in 1854 by Bishop (afterward Archbishop) Spalding, and in 1875 had charge of six schools there, of one in Baltimore, and of the St. Mary's industrial school for boys near that city. 7. The "Brothers of Charity," founded in 1809, in Belgium, by Canon P. Triest, for the education of the blind and deaf mutes, and the training of orphans. In January, 1874, they took charge of the industrial school of the Angel Guardian in Boston, Mass. Besides these, there are in the United States and Canada congregations of men forming an integral portion of religious orders comprising priests. Such are the "Josephites" or "Brothers of St. Joseph," who are only a branch of the congregation of the Holy Cross, founded in 1834 at Le Mans, France, by Abbé Moreau, the various communities of Franciscan brothers belonging to the third order of St. Francis, and dependent on the Franciscan priests, and the "Clerks of Saint Viator."

II. SCHOOL SISTERS. Of these congregations the most important are the following: 1. The Ursulines. (See *URSULINES*.) 2. The "Sisters of the Visitation of Our Lady," founded in 1610 at Annecy in Savoy, by St. Francis of Sales and St. Jeanne Françoise de Chantal. The order numbered 87 establishments at the death of the latter in 1641, and 160 in 1700, with 6,600 members. It was approved by Pope Urban VIII. in 1626. The first establishment in the United States was made in Washington in 1808, and the order has now (1875) other monasteries and schools in Maryland, Virginia, West Virginia, Kentucky, New York, Delaware, and Minnesota. 3. The "Sisters of Notre Dame," or "School Sisters of the Blessed Peter Fourier," founded by him and Alice Leclerc at Mataincourt, France, in 1597, abolished in 1789, revived at Ratisbon in 1832, confirmed by Pope Pius IX. in 1854, and first introduced into the United States in 1847. In 1875 they had establishments in Maryland,

New Jersey, New York, Kentucky, Illinois, Michigan, Missouri, Wisconsin, Iowa, and Minnesota. 4. The "Sisters of Notre Dame de Namur," founded at Amiens, France, in 1804, by Père Joseph Désiré Varin, Julie Billiart, and Marie Louise Françoise Blin de Bourdon, and transferred to Namur, Belgium, in 1809. Its object is to educate girls of the middle classes, and it was approved June 28, 1844, by Pope Gregory XVI. It spread rapidly through Belgium, France, Great Britain, and Ireland. The English government intrusted to the order the direction of normal schools for Roman Catholic pupil-teachers. They were called to Cincinnati in 1840 by Bishop (afterward Archbishop) Purcell, to Oregon by Archbishop Blanchet in 1843, to California in 1851, and to Guatemala in 1859. In 1871 this sisterhood owned 82 establishments, of which 20 were in the United States, with a total of 26,000 pupils. 5. The "Sisters of the Congregation of Notre Dame," founded at Montreal, Canada, in 1653, by Marguerite Bourgeoys, and approved by Bishop de Laval of Quebec, and now the most numerous teaching body in Canada. The mother house is at Montreal. At the close of 1874 the order numbered 569 professed sisters and 88 novices, with 56 establishments in Canada and the United States. 6. "Ladies of the Sacred Heart." (See *SACRED HEART, LADIES OF THE*.) The preceding congregations have for their primary object the instruction of young girls. Others combine with the labor of teaching the care of orphan asylums, the visitation of the sick and poor, and the direction of hospitals. Such are: 1. The "Ladies of the Incarnate Word," founded in 1625 by Jeanne Marie Chézard de Matel, and approved by Urban VIII. in 1633. Their sole object at first was education; they assumed the direction of hospitals in 1866. They have many establishments in France, and eight in Texas. 2. The "Poor Handmaids of Jesus Christ," founded Aug. 15, 1849, at Dernbach, Nassau, by Katharine Kaspar, approved by Pius IX. in 1860, and confirmed in 1870. Their first establishment in this country was at Fort Wayne, Ind., in August, 1868. They numbered 45 sisters and five houses in 1875. 3. The "Sisters of Our Lady of Charity," or "Eudist Sisters," founded in 1641 at Caen in Normandy, by Abbé Jean Eudes. In 1835 a modification of the rule enabling them to take charge of penitent women was introduced at Angers, the establishment there becoming known as the "House of the Good Shepherd." The change was approved by Pope Gregory XVI., and the order thereafter was called the "Sisters of Our Lady of Charity of the Good Shepherd." They have numerous establishments in Europe, came to the United States in 1842, and have opened houses in the principal cities of the Union and in Canada. 4. The "Presentation Nuns," founded at Cork, Ireland, in 1777, by Miss Nano Nagle, for the visitation of the sick and poor and the instruc-

tion of poor children. They have since forborne from visiting the sick, and become strictly cloistered. Their rules were approved by Pius VII. in 1805. Their first establishment in America was at St. John's, Newfoundland, and the first in the United States was made in New York city, Sept. 8, 1874. 5. The "Sisters of Mercy." (See MERCY, SISTERS OF.) 6. The "Sisters of Charity." (See CHARITY, SISTERS OF.) 7. The "Gray Nuns" or "Sisters of Charity of Montreal," founded there in 1745 by Mme. d'Youville, and trained to take charge of hospitals, asylums, and schools. The 24 houses dependent on Montreal in 1875 numbered 225 professed nuns and 51 novices, laboring in Canada and the United States. The houses dependent on the central establishment in Quebec numbered 107 sisters. 8. The "Sisters of St. Joseph." There are several congregations bearing this name. The principal one was founded at Le Puy, France, in 1650, by Abbé Jean Pierre Médaille, and introduced into the United States by Bishop Rosati of St. Louis in 1836. In 1875 they had establishments in the principal eastern and western states. Besides these, several less numerous congregations have originated in America, which are chiefly devoted to education. Among them are: the "Sisters of Charity of Nazareth," founded in 1812 in Kentucky, by Bishop David; the "Sisters of Loreto," founded in Kentucky in 1812, by the Rev. Charles Nerinckx, and now having establishments in nearly all the western states; the colored "Oblate Sisters of Providence," founded at Baltimore in 1825 by the Rev. H. Joubert, approved by Pius VIII. in 1831, and now increasing in numbers in consequence of the mission to the blacks intrusted to the missionary society of St. Joseph, under the guidance of the Oblates of St. Charles (see OBLATES OF ST. CHARLES); and the "Sisters of Charity of the Blessed Virgin," founded at Philadelphia by the Rev. T. C. Donaghoe, and removed afterward to Iowa, where they have several establishments. In Canada there are the "Sisters of St. Anne," founded at Vaudreuil near Montreal in 1848, by the Right Rev. Ignace Bourget, bishop of that city, approved by Pius IX. in 1860, and introduced into Oswego, N. Y., in 1866; they are exclusively school sisters.

SCHOOLCRAFT, a county of the upper peninsula of Michigan, bounded N. by Lake Superior and S. E. by Lake Michigan; area, about 2,300 sq. m.; pop. in 1874, 1,290. It is drained by the Manistique river and other streams. The surface is rough and broken, and mostly covered with dense forests of pine. Lumbering is the chief occupation. In 1870 there were two blast furnaces and four saw mills in operation. The "Pictured Rocks," a perpendicular wall many miles long and 200 to 300 ft. high, curiously stratified, are in this county, on the S. shore of Lake Superior. Capital, Onota.

SCHOOLCRAFT, Henry Rowe, an American author, born in Watervliet (now Guilderland),

Albany co., N. Y., March 28, 1793, died in Washington, D. C., Dec. 10, 1864. He studied at Union college, and under Prof. F. Hall of Middlebury college, Vt., learned the art of glass making, made a mineralogical and geological tour in the west in 1817-'18, was geologist of an exploring expedition in the Lake Superior copper region and on the upper Mississippi in 1820, travelled as Indian commissioner in Illinois and along the Wabash and Miami rivers in 1821, and in 1822 was Indian agent at Sault Ste. Marie and Michilimackinac. In 1823 he married the granddaughter of an Indian chief. He was a member of the Michigan legislature from 1828 to 1832, and founded the Michigan historical society and the Algic society at Detroit. Before the latter he read two lectures on the Indian languages, for which he received a gold medal from the French institute. In 1832 he conducted the expedition which discovered the source of the Mississippi, and in 1836 secured the cession by the Indians of 16,000,000 acres of land to the United States. He was appointed acting superintendent of Indian affairs in 1836, and chief disbursing agent for the northern department in 1839. In 1845 he made a census of the Six Nations of New York for the state legislature, and in 1847 removed to Washington, and engaged under the appointment of the government in the preparation of a work entitled "Historical and Statistical Information respecting the History, Condition, and Prospects of the Indian Tribes of the United States" (6 vols. 4to, with 336 plates, Philadelphia, 1851-'7). He also published, in connection with his researches, "A View of the Lead Mines of Missouri" (8vo, New York, 1819); "Travels in the Central Portions of the Mississippi Valley" (1825); "Narrative of an Expedition to Itasca Lake, the actual Source of the Mississippi" (1834; republished, with the account of the expedition of 1820, under the title "Narrative of an Exploratory Expedition to the Sources of the Mississippi River in 1820, completed by the Discovery of its Origin in Itasca Lake in 1832," Philadelphia, 1853); "Algic Researches" (2 vols. 12mo, New York, 1839; republished under the title "The Myth of Hiawatha and other Oral Legends," 8vo, Philadelphia, 1856); "Oneota, or Characteristics of the Red Race of America" (New York, 1844); "Notes on the Iroquois" (Albany, 1848); "Personal Memoirs of a Residence of Thirty Years with the Indian Tribes" (8vo, Philadelphia, 1851); and "Scenes and Adventures in the Semi-Alpine Regions of the Ozark Mountains" (Philadelphia, 1853). "The Indian Fairy Book" has been compiled from his manuscripts by C. Mathews (New York, 1868).

SCHOOLS. See COLLEGE, COMMON SCHOOLS, EDUCATION, INFANT SCHOOLS, MILITARY SCHOOLS, NORMAL SCHOOLS, REFORMATORIES, and UNIVERSITY.

SCHOPENHAUER, Arthur, a German philosopher, born in Dantzic, Feb. 22, 1788, died in

Frankfort, Sept. 21, 1860. His father was a banker, and left him a fortune; and his mother, Johanna Frosina (1770–1838), was a novelist of merit. He studied at Göttingen and Berlin, and in 1813 maintained at the university of Jena a thesis entitled *Ueber die vierfache Wurzel des Satzes vom zureichenden Grunde*, which contained the germs of his future philosophy. In 1814 he spent the winter at Weimar with Goethe, who initiated him into his own studies on colors, and Schopenhauer in 1816 published *Ueber Sehen und Farben*. From 1814 to 1818 he lived at Dresden, and brought his philosophical views into a system, exhibited in *Die Welt als Wille und Vorstellung* (1819; English translation by Franz Hüffer, London, 1874). (See PHILOSOPHY, vol. xiii., p. 442.) In 1820 he lectured for six months at the university of Berlin, and in 1831 settled at Frankfort. His remaining works are: *Ueber den Willen in der Natur* (1836); *Die Freiheit des menschlichen Willens* (1839) and *Das Fundament der Moral* (1841), which were combined and revised under the title *Die beiden Grundprobleme der Ethik* (1860); and *Parerga und Paralipomena* (1851), a collection of essays and his most popular work. A complete edition of his works has been published by Julius Frauenstädt (6 vols., Leipsic, 1874), who has also written *Schopenhauer, Lichtstrahlen aus seinen Werken*, with a biography (3d ed., Leipsic, 1874).—See also *Philosophie de Schopenhauer*, by Th. Ribot (Paris, 1875).

SCHRADER, Julius, a German painter, born in Berlin, June 16, 1815. He studied in Düsseldorf, and in 1844 received the great academical prize in Berlin, which provided him with a three years' pension during his residence in Rome. In 1851 he became professor at the Berlin academy, and member of the academical senate. He excels in painting nude figures, drapery, and costumes. His best known works are: "The Death of Leonardo de Vinci," "The Surrender of Calais," the fresco in the new Berlin museum of the "Consecration of the Church of St. Sophia in Constantinople by the Emperor Justinian," "Charles I. saying Farewell to his Family," "Esther in the presence of Ahasuerus," "Lady Macbeth walking in Sleep," "Cromwell at his Daughter's Deathbed," and the portraits of Alexander von Humboldt, Cornelius, Ranke, and Moltke.

SCHREVELIUS, or Schrevel, Cornelius, a Dutch scholar, born in Haarlem in 1615, died in Leyden, Sept. 11, 1664. He succeeded his father as rector of the college in Leyden in 1642. He published *variorum* editions of many classical authors, and a *Lexicon Manuale Græco-Latinum et Latino-Græcum* (1654), which, often republished, has been more extensively used than almost any other work of the kind.

SCHREYER, Adolph, a German painter, born in Frankfort in 1828. He completed his studies of the horse in Stuttgart, Munich, and Düsseldorf, accompanied the Austrian army in 1854 to the Danubian principalities, travelled

through Turkey, Hungary, and southern Russia, and in company with Prince Thurn and Taxis through Egypt, Syria, and Algeria; and he subsequently resided in Paris. His pictures of animals, especially of horses, and also those of human beings and of landscapes, are remarkable for vigor and brilliant coloring. Among the most celebrated are an "Artillery Attack at Traktir," "Horses frightened by Wolves," "The Dying Horse," "The Wallachian Stud," "The Wallachian Extra-Post," and "The Csikós driving his Horses across the Plain." He has repeatedly received medals at the Paris exhibition.

SCHRÖCKH, Johann Matthias, a German church historian, born in Vienna, July 26, 1733, died in Wittenberg, Aug. 2, 1808. He was successively professor of philosophy, of poetry, and of history at Wittenberg. His most important works are *Christliche Kirchengeschichte* (35 vols., Leipsic, 1768–1803; 2d ed. by Tzschirner, vols. i.–xiv., 1772–1825), and *Kirchengeschichte seit der Reformation* (8 vols., Leipsic, 1804–'9; 2 vols. added by Tzschirner, 1812).

SCHRÖDER. I. Antoinette Sophie, a German actress, born in Paderborn, Feb. 29, 1781, died in Munich, Feb. 25, 1868. She was a daughter of the comedian Bürger, and became a celebrated tragedian, excelling as Phædra, Medea, and Lady Macbeth, and successively performing at Hamburg, Vienna, and Munich. Her last public appearance was at the Schiller centenary in 1859, when she recited the "Song of the Bell." She was separated from her first husband, the actor Stollmers or Smets, soon after their marriage in 1795; the singer Friedrich Schröder, who married her in 1804, died in 1818; and she did not live long with her third husband, the actor Kunst.—See *Sophie Schröder*, by P. Schmidt (Vienna, 1870).

II. Wilhelmine Schröder-Devrient, a German singer, daughter of the preceding, born in Hamburg, Dec. 6, 1804, died in Gotha, Jan. 26, 1860. In her childhood she performed as a ballet dancer; in her 15th year she appeared at Vienna in Racine's *Phèdre*; and in the following year she displayed great genius as a singer, and soon eclipsed all other prima donnas by her powerful voice and her excellent acting, especially in *Fidelio*, *Euryanthe*, *Norma*, *La sonnambula*, as Romeo, as Desdemona, and as Valentine in the "Huguenots." In 1828 she was separated from her first husband, Karl August Devrient, and subsequently at Dresden from her second husband, the Saxon officer Döring, after which she married the Livonian nobleman Von Bock.—See *Wilhelmine Schröder*, by Wolzogen (Leipsic, 1863).

SCHRÖDER, Friedrich Ludwig, a German actor, born in Schwerin, Nov. 3, 1744, died in Hamburg, Sept. 3, 1816. In his childhood he performed in the strolling company of his parents, and before the age of 30 he had become one of the greatest German tragedians. In 1771 he assumed the management of the theatre at Hamburg, and wrote plays, besides translating

several of Shakespeare's, which he was the first to introduce upon the German stage. His *Dramatische Werke* were edited by Bülow, with an introduction by Tieck. His life was written by F. L. W. Meyer (2 vols., Hamburg, 1810), and by Brunier (Leipsic, 1864).

SCHRÖDTER, Adolph, a German painter, born in Schwedt, Prussia, June 28, 1805. He studied copperplate engraving in Berlin seven years, and subsequently resided as a painter at Düsseldorf and Frankfurt. In 1859 he became professor at the polytechnic school in Carlsruhe. He is distinguished for his humorous pieces, especially his "Wine Tasters" (1832), "Auerbach's Cellar" (1848), and more recently "Hans Sachs" and "Falstaff and the Page," and for genre pictures of a serious character.

SCHUBART, Christian Friedrich Daniel, a German poet, born at Obersontheim, Swabia, March 26, 1739, died in Stuttgart, Oct. 10, 1791. After a dissolute and adventurous life, he was driven from Augsburg, where he had established the *Deutsche Chronik* (1774-'7), for deriding the clergy, and transferred it to Ulm; and for publishing there a false report of the death of Maria Theresa he was imprisoned about ten years. Schiller visited him during that period, and the king of Prussia obtained his release in 1787. In Stuttgart, where he became musical director and director of the theatre, he continued his periodical under the title of *Vaterlands-Chronik*. He wrote *Gedichte aus dem Kerker* (1785), *Hymnus auf Friedrich den Grossen* (1786), an autobiography, and a large number of religious songs. His *Gesammelte Schriften und Schicksale* appeared in 8 vols. (Stuttgart, 1839-'40).—See *Schubart's Leben in seinen Briefen*, by David Friedrich Strauss (2 vols., Berlin, 1849).

SCHUBERT, Franz, a German composer, born at Lichtenthal, near Vienna, Jan. 31, 1797, died in Vienna, Nov. 19, 1828. His father was a school teacher, from whom he received his first lessons. Having a fine voice, he was admitted to the academy of the "Konvict," and became a member of the imperial chapel choir, then conducted by Salieri, whose favorite pupil he was. While at school he experimented on almost every variety of music, to some of which he gave curiously mournful titles, as "The Parricide" and the "Corpse Fantasia." Leaving the academy in 1813, he assisted his father in teaching for three years, but did not neglect his music, for during 1815 alone he wrote more than 100 songs, six operas and operettas, and some symphonic pieces, besides church and chamber music. In 1818 he was engaged by Count Esterházy to teach his two daughters; and while living with this family he composed many of his best quartets and songs. His music was not popular with the Viennese public, and he constantly experienced the mortification of seeing inferior works preferred to his own. In the spring of 1828 he gave his first and only concert. Intense enthusiasm was awakened, but the encourage-

ment that might have proved his salvation some years before came too late, and after a life of disappointment, embittered by failing health, he died at the age of 31. He left an astonishing number of compositions, including nine symphonies, several operas, masses, overtures, a great deal of chamber and pianoforte music, and about 600 songs. Of all this music but little was published during his life, and he heard but a very small portion of it publicly performed, being known to his contemporaries mostly as a song writer. He raised the German *Lied* to a place in musical art which it had not previously occupied. His fame is almost wholly posthumous, and has constantly gained strength since his death. Biographies of Schubert have been written by Kreissle von Hellborn (Vienna, 1864; English translation by E. Wilberforce, London, 1866) and Reissmann (Berlin, 1874).

SCHUBERT, Gotthilf Heinrich von, a German mystic, born at Hohenstein, Saxony, April 26, 1780, died at Laufzorn, Upper Bavaria, July 1, 1860. He studied theology at Leipsic and medicine at Jena, practised medicine at Altenburg, Freiberg, and Dresden, was director of an educational institution in Nuremberg from 1809 to 1816, tutor to the children of the grand duke of Mecklenburg-Schwerin till 1819, and professor of the natural sciences at Erlangen till 1827, and subsequently at Munich. He was a disciple of Schelling, and published numerous works embodying mystical interpretations of natural phenomena, and forming a system of objective idealism. Among them are: *Ahnungen einer allgemeinen Geschichte des Lebens* (3 vols., Leipsic, 1806-'20); *Ansichten von der Nachtseite der Naturwissenschaften* (1808; 4th ed., 1840); *Symbolik des Traums* (1814; 4th ed., 1862); *Geschichte der Seele* (1830; 2d ed., 1833); and *Altes und Neues aus dem Gebiete der innern Seelenkunde* (5 vols., 1817-'44). He also published manuals of natural history, narratives of travel in France, Italy, and the Levant, several volumes of tales and biographies, and an autobiography (3 vols., Erlangen, 1853-'6).

SCHULTE, Johann Friedrich, a German theologian, born at Winterberg, Westphalia, April 23, 1827. He graduated at the university of Berlin in 1851, and practised law in Berlin, Arnberg, and Bonn. In 1855 he was appointed professor of canon law in the university of Prague, and in 1863 a member of the Austrian council of instruction. During the Vatican council he declared himself opposed to the declaration of pontifical infallibility; and after the proclamation of the dogma he took sides with Dr. Döllinger and the Old Catholics. In 1871 he published at Prague a pamphlet entitled "The Power of the Roman Popes over Princes, Countries, Peoples, and Individuals examined by the light of their Doctrines and Acts since the reign of Gregory VII., to serve for the appreciation of their Infallibility, and set face to face with contradictory doctrines of

the Popes and Councils of the first Eight Centuries." To this Bishop Fessler of St. Pölten replied in "The True and False Infallibility" (English ed., London and New York, 1875). Dr. Schulte, having resigned his offices in the university of Prague and the consistorial court, was in 1872 appointed by the German government professor in the university of Bonn. His principal works are: *System des katholischen Kirchenrechts* (Giessen, 1856); *Die Lehre von den Quellen des katholischen Kirchenrechts* (1860); *Lehrbuch des katholischen Kirchenrechts* (1868); *Lehrbuch der deutschen Reichs- und Rechtsgeschichte* (2 vols., Stuttgart, 1861-'70); *Die Rechtsfrage des Einflusses der Regierungen bei den Bischofswahlen* (Giessen, 1869); and *Die Macht der römischen Päpste*, &c. (Prague, 1871).

SCHULTZ-SCHULTZENSTEIN, Karl Heinrich, a German physiologist, born at Alt-Ruppin, Prussia, July 8, 1798, died in Berlin, March 27, 1871. He graduated at Berlin, where he became in 1825 extraordinary, and in 1833 ordinary professor of physiology. His works relating to his microscopical investigations of the movement of sap and the internal organization of plants include *Die Natur der lebendigen Pflanze* (2 vols., Berlin, 1823); *Sur la circulation et sur les vaisseaux lactifères dans les plantes* (1839), crowned by the French academy; *Die Cyclose des Lebenssaftes in den Pflanzen* (Bonn and Breslau, 1841); *Ueber Anaphytose oder Verjüngung der Pflanzen* (Berlin, 1843); *Neues System der Morphologie der Pflanzen* (1847); and *Die Verjüngung im Pflanzenreich* (1851). In animal physiology his most important works are *Ueber die Verjüngung des menschlichen Lebens* (Berlin, 1842) and *Die Verjüngung im Thierreich* (1854). He endeavored to found a new system of psychology in his treatises *Die Bildung des menschlichen Geistes durch Cultur der Verjüngung* (1855), *Die Moral als Heilwissenschaft und Culturwissenschaft* (1863), and *Die Physiologie der Verjüngung des Lebens im Unterschiede von dynamischen und materialistischen Stoffwechseltheorien* (1867). He also wrote on the history of medicine and the theory of disease.

SCHULTZE, Max, a German anatomist, born about 1825, died in Bonn, Jan. 16, 1874. He was professor at Bonn, where he superintended the establishment of the new anatomical laboratory. From 1858 to 1861 he elaborated the protoplasm theory. (See PROTOPLASM.) His works comprise *Innere Bewegungserscheinungen bei Diatomeen* (in Troschel's *Archiv für Naturgeschichte*, 1860); *Ueber Muskelkörperchen* (1860); *Das Protoplasma der Rhizopoden und der Pflanzenzellen* (1863); and *Zur Anatomie und Physiologie der Retina* (1866).

SCHULZE, Ernst Konrad Friedrich, a German poet, born in Celle, March 22, 1789, died there, June 29, 1817. He studied theology at Göttingen, and afterward graduated in philology, but his friend Bouterwek turned his at-

tention to æsthetic and classical studies. He wrote *Cécilie*, a romantic poem (2 vols., new ed., Leipsic, 1822), idealizing Cécilie Tychsen, a deceased lady to whom he had been attached. After participating in the war against France in 1814, he wrote *Die bezauberte Rose* (11th ed., Leipsic, 1867), which has been translated into English and French. His collected works have been edited by Bouterwek (4 vols., Leipsic, 1822) and Marggraff (5 vols., 1855).

SCHUMACHER, Heinrich Christian, a Danish astronomer, born at Bramstedt, Holstein, Sept. 3, 1780, died Dec. 28, 1850. He was educated at Kiel, Jena, Copenhagen, and Göttingen, resided from 1807 to 1810 in Altona, and in 1810 became extraordinary professor in the university of Copenhagen. In 1813 he became superintendent of the observatory at Mannheim, and in 1815 ordinary professor of astronomy and superintendent of the observatory at Copenhagen. In 1816 he was employed to measure the territory of Hamburg, and in 1817 to measure the degrees of latitude from Lauenburg to Skagen, and the degrees of longitude from Copenhagen to the W. coast of Jutland. In 1821 he received the direction of the survey and mapping of Holstein and Lauenburg, and from that time lived in Altona. In 1824, in connection with the English board of longitude, he determined the difference of longitude between the observatories of Greenwich and Altona, and in 1830 he made at the castle of Göldestein the observations in regard to the length of the seconds pendulum which served as the base of the Danish scale of measures. In 1822 he published accurate accounts of the distances of Venus, Jupiter, Mars, and Saturn from the moon. In 1821 he began his *Astronomische Nachrichten*, which is still continued; and in conjunction with other astronomers, especially Bessel, he undertook at Stuttgart in 1836 the editing of an *Astronomisches Jahrbuch*.—His nephew CHRISTIAN ANDREAS, born Sept. 6, 1810, has published a course of lectures on astronomy, and a Danish translation of Humboldt's *Kosmos* (1847), and since 1848 has edited at Copenhagen the scientific and industrial journal *Nordlyset*.

SCHUMANN, Robert, a German composer, born in Zwickau in 1810, died at Endenich, near Bonn, July 29, 1856. His father was a bookseller and publisher. At the age of eleven he wrote little choral and orchestral works. His musical education was to a great extent self-directed, and it was not until he went to the university of Leipsic in 1828 that he received intelligent instruction in music from Friedrich Wieck. In 1829 he attended lectures at Heidelberg, returning to Leipsic in 1830 to receive instruction in counterpoint and composition from Heinrich Dorn. Here he acquired that systematic knowledge of thorough bass which he had thought unnecessary in his early years, and for want of which his earlier compositions lack grace of form and freedom of expression. With a view to obtaining flexibility of the

muscles of his hand, and to shortening the months of practice necessary to acquire technical facility, he experimented upon his fingers with a machine of his own invention, which finally deprived the sinews of the third finger of his right hand of their natural elasticity, and made it impossible that he should ever become a pianist. In April, 1834, in connection with several friends, he founded the *Neue Zeitschrift für Musik*, which he long conducted in a broad, generous, and noble spirit. The years from 1837 to 1840 were rendered unhappy by the resistance of Friedrich Wieck to the marriage of Schumann with his daughter Clara, an eminent pianist. Schumann finally appealed to the law to compel the father's consent, and obtained a favorable decision from the royal court of appeals; and the marriage took place in September, 1840. Up to this period nearly all his compositions had been for the piano. During this year he devoted himself to compositions for the voice, producing 138 songs, some for one and some for more voices; very many of these have become classic. In this year also he was made doctor of philosophy by the university of Jena. Between 1840 and 1854 he produced those great works upon which his fame chiefly rests: his symphonies, his quintet opus 44 and quartet opus 47, "Paradise and the Peri," "The Pilgrimage of the Rose," and many other works of large scope. In 1850 he succeeded Ferdinand Hiller as director of music at Düsseldorf; but he lacked many of the essential qualities of a good conductor, and in 1853 his engagement terminated. Even before this time the mental malady that darkened his closing years had begun to develop itself. In February, 1854, he threw himself into the Rhine. He was rescued and removed to a private asylum at Eendenich, but never recovered his reason. His works embrace almost every variety of composition for voice and instruments. A second edition of his *Gesammelte Schriften über Musik und Musiker* appeared in Leipsic in 1875 (2 vols.).

SCHURZ, Carl, an American statesman, born at Liblar, near Cologne, Prussia, March 2, 1829. He was educated at the gymnasium of Cologne and the university of Bonn, which he entered in 1846. At the outbreak of the revolution of 1848 he joined Gottfried Kinkel, professor of rhetoric in the university, in the publication of a liberal newspaper, of which for a time he was the sole conductor. In the spring of 1849, in consequence of an unsuccessful attempt to promote an insurrection at Bonn, he fled with Kinkel to the Palatinate, entered the revolutionary army as adjutant, and took part in the defence of Rastadt. On the surrender of that fortress he escaped to Switzerland. In 1850 he returned secretly to Germany, and with admirable skill and self-devotion effected the escape of Kinkel from the fortress of Spandau, where he had been condemned to 20 years' imprisonment. In

the spring of 1851 he was in Paris, acting as correspondent for German journals, and he afterward spent a year in teaching in London. He came to the United States in 1852, resided three years in Philadelphia, and then settled in Madison, Wis. In the presidential canvass of 1856 he delivered speeches in German in behalf of the republican party, and in the following year was defeated as a candidate for lieutenant governor of Wisconsin. During the contest between Mr. Douglas and Mr. Lincoln for the office of United States senator from Illinois, in 1858, he delivered his first speech in the English language, which was widely republished. Soon after he removed to Milwaukee and began the practice of law. In the winter of 1859-'60 he made a lecture tour in New England, and aroused attention by a speech delivered in Springfield, Mass., against the ideas and policy of Mr. Douglas. He was an influential member of the republican national convention of 1860, being largely instrumental in determining that portion of the platform relating to citizens of foreign origin, and spoke both in English and German during the canvass which followed. President Lincoln appointed him minister to Spain, which post he resigned in December, 1861, in order to enter the army. In April, 1862, he was commissioned brigadier general of volunteers, and on June 17 assumed command of a division in the corps of Gen. Sigel, with which he took part in the second battle of Bull Run. He was made major general, March 14, 1863, and at the battle of Chancellorsville commanded a division of Gen. Howard's corps (the 11th), which was routed by Jackson. He had temporary command of the 11th corps at the battle of Gettysburg, and subsequently took part in the battle of Chattanooga. On the close of the war he returned to the practice of law. In 1865-'6 he was the Washington correspondent of the New York "Tribune," and in 1866 he made a report, as special commissioner appointed by President Johnson, on the condition of the southern states, which was submitted to congress. In the same year he removed to Detroit, where he founded the "Detroit Post;" and in 1867 he became editor of the *Westliche Post*, a German newspaper published in St. Louis. He was temporary chairman of the republican national convention in Chicago in 1868, and labored earnestly in the succeeding canvass for the election of Gen. Grant. In January, 1869, he was chosen United States senator from Missouri, for the term ending in 1875. He opposed some of the leading measures of President Grant's administration, and in 1872 took a prominent part in the organization of the liberal party, presiding over the convention in Cincinnati which nominated Horace Greeley for the presidency. He visited Europe in 1873, and again in 1875, being received with much consideration in his native country. On his return he took part in the political canvass in Ohio, in which he opposed

strenuously the increase of the national currency. Among his more celebrated speeches are: "The Irrepressible Conflict" (1858); "The Doom of Slavery" (1860); "The Abolition of Slavery as a War Measure" (1862); and "Eulogy on Charles Sumner" (1874). A volume of his speeches was published in 1865 (12mo, Philadelphia).

SCHUYLER. I. A S. W. county of New York; area, 352 sq. m.; pop. in 1870, 18,989. The southern portion of Seneca lake, and Little, Mud, and other small lakes, are within its borders. It is traversed by the Chemung and Elmira, Jefferson, and Canandaigua railroad and the Chemung canal. The surface is hilly and the soil fertile. The chief productions in 1870 were 238,803 bushels of wheat, 21,408 of rye, 178,074 of Indian corn, 520,160 of oats, 269,945 of barley, 118,986 of buckwheat, 42,410 tons of hay, 221,749 lbs. of wool, 853,374 of butter, 40,579 of cheese, and 32,374 of honey. There were 5,665 horses, 7,440 milch cows, 6,471 other cattle, 40,237 sheep, and 3,515 swine; 5 manufactories of agricultural implements, 10 of carriages and wagons, 6 of cooperage, 1 of hinges, 3 of iron castings, 2 of marble work, 1 of machinery, 1 of malt, 12 of saddlery and harness, 1 of stone and earthen ware, 3 of woollen goods, 9 tanneries, 9 flour mills, and 10 saw mills. Capital, Havana.

II. A W. county of Illinois, bordered S. E. by the Illinois river and S. W. by Crooked creek; area, 420 sq. m.; pop. in 1870, 17,419. The surface is undulating and the soil excellent. The chief productions in 1870 were 221,945 bushels of wheat, 20,841 of rye, 440,975 of Indian corn, 119,359 of oats, 13,361 tons of hay, 4,866 lbs. of tobacco, 52,532 of wool, 213,030 of butter, 13,045 of honey, and 35,144 gallons of sorghum molasses. There were 6,479 horses, 4,192 milch cows, 8,441 other cattle, 15,419 sheep, and 23,357 swine; 7 manufactories of carriages and wagons, 1 of woollen goods, and 12 saw mills. A branch of the Chicago, Burlington, and Quincy railroad enters it. Capital, Rushville. III. A N. E. county of Missouri, bordering on Iowa, bounded W. by Chariton river and drained by the N. fork of Salt river and the head streams of Fabius river; area, 324 sq. m.; pop. in 1870, 8,820. It is traversed by the Missouri, Iowa, and Nebraska, and the St. Louis, Kansas City, and Northern railroads. The soil is rich, and the surface diversified by woodland and prairie. The chief productions in 1870 were 49,727 bushels of wheat, 279,460 of Indian corn, 125,442 of oats, 6,313 tons of hay, 22,094 lbs. of tobacco, 47,717 of wool, 129,451 of butter, and 19,755 gallons of sorghum molasses. There were 3,686 horses, 1,002 mules and asses, 3,206 milch cows, 4,185 other cattle, 15,961 sheep, and 11,928 swine. Capital, Lancaster.

SCHUYLER, Eugene. See supplement.

SCHUYLER, Philip, an American general, born in Albany, N. Y., Nov. 22, 1733, died there, Nov. 18, 1804. He inherited, according to the

law of primogeniture, the whole of his father's estate, but divided it equally among his brothers and sisters. He entered the army in 1755, and accompanied Sir William Johnson to Fort Edward and Lake George. After the peace he was a member of the colonial assembly of New York. In 1775 he was a delegate to the continental congress, which appointed him a major general and placed him in command of the army in New York and the preparations for an expedition against Canada; but he was taken sick, and the command devolved upon Montgomery. He subsequently conducted the operations against Burgoyne, but after St. Clair's evacuation of Ticonderoga suspicions against Schuyler caused him to be superseded by Gates. His conduct was afterward fully approved by a court of inquiry, but he refused to resume command, though continuing to render important services in the military operations in New York. He was a member of the continental congress from 1778 to 1781, and United States senator from 1789 to 1791, and was again appointed to that office in 1797, but did not serve.--See "Life and Times of Philip Schuyler," by Benson J. Lossing (2 vols. 12mo, New York, 1860-'62; enlarged ed., 1872).

SCHUYLKILL, a river of E. Pennsylvania, rising in the carboniferous highlands of Schuylkill co. and flowing S. E. into the Delaware river at Philadelphia; length, 120 m. It has slack-water navigation to Port Carbon, 3 m. above Pottsville. The tide ascends to Fairmount dam in Philadelphia.

SCHUYLKILL, an E. county of Pennsylvania, drained by the Schuylkill river, bounded S. E. by Kittatinny or Blue mountain, and traversed by the Broad, Sharp, and Mahanoy mountains; area, 750 sq. m.; pop. in 1870, 116,428. The surface is very mountainous, and the soil except along the streams generally poor. Anthracite coal and iron are extensively mined; the production of the former in 1870 was 3,860,144 tons, valued at \$10,289,043. Several railroads pass through it. The chief agricultural productions in 1870 were 115,831 bushels of wheat, 86,410 of rye, 267,560 of Indian corn, 288,356 of oats, 234,374 of potatoes, 33,154 tons of hay, 6,685 lbs. of wool, and 383,495 of butter. There were 3,712 horses, 5,883 milch cows, 5,255 other cattle, 3,100 sheep, and 10,831 swine; 4 manufactories of forged and rolled iron, 4 of pig iron, 23 of castings, 15 of tanned and 11 of curried leather, 22 of machinery, 47 flour mills, and 21 saw mills. Capital, Pottsville.

SCHWAB, Gustav, a German poet, born in Stuttgart, June 19, 1792, died there, Nov. 4, 1850. He studied in Tübingen, where he was tutor in the theological seminary till 1817, when he became professor of ancient literature in the upper gymnasium of Stuttgart. From 1837 to 1845 he was a clergyman near and in Stuttgart, and subsequently he became chief councillor of studies and of the evangelical consistory. His Swabian romances and

ballads rank next to those of Uhland. His principal poetical works are: *Gedichte* (2 vols., 1828-'9); *Fünf Bücher deutscher Lieder und Gedichte* (1835; 5th ed., 1871); and *Neue Auswahl* (1838; 4th ed., 1851). Prominent among his prose writings are *Die schönsten Sagen des klassischen Alterthums* (3 vols., 1838-'40; 4th ed., 1853), and *Schiller's Leben* (1840; 2d ed., 3 parts, 1841-'4).

SCHWALBACH, or **Langenschwalbach**, a watering place of Germany, in the Prussian province of Hesse-Nassau, 8 m. N. W. of Wiesbaden; pop. in 1871, 2,643. It adjoins Schlangenbad, and is celebrated as having the strongest of all chalybeate springs. A new bath house was established in 1866. The number of visitors annually is about 6,000. Large quantities of the water are exported.

SCHWANTHALER, **Ludwig Michael**, a German sculptor, born in Munich, Aug. 26, 1802, died there, Nov. 15, 1848. He studied under his father, and became in 1835 professor at the academy of Munich, after several visits to Rome. His works are numerous, including the frieze for the Barbarossa hall at Munich, more than 200 ft. long; the model for the images of the 12 ancestors of the house of Wittelsbach, in the new palace at Munich; the 15 statues of the "Battle of Arminius" for the Walhalla; the colossal statue of Bavaria, at Munich, which he left unfinished; and the statue of Mozart in Salzburg.—See *Schwanthaler's Reliquien*, by Trautmann (Munich, 1858).

SCHWARTZ, **Marie Sophie**, a Swedish novelist, born at Borås, July 4, 1819. She is a daughter of Johan Birath, a merchant, and married in 1839 Prof. Gustavus Magnus Schwartz, a physiologist, who died in 1858. Since that date she has published numerous novels, of which a complete German translation has appeared in Stuttgart (54 vols., 1865-'71). Some of them have been published in English in the United States, including "Gold and Name," "Birth and Education," and "Guilt and Innocence."

SCHWARTZENBERG. See **SCHWARZENBERG**.

SCHWARZ, **Berthold**, a German alchemist, whose real name was believed to be Konstantin Ancklitz, born in Freiburg, Breisgau, probably in the beginning of the 14th century. He was a Franciscan monk either at Mentz or at Nuremberg, and his cloistral name was Berthold. The surnames of Schwarz ("black") and "the Black Barthel" were given him on account of his partiality for the black art; and he is said to have discovered gunpowder while in prison on a charge of sorcery. According to other versions, he discovered it either at Cologne or at Goslar. Whether he made an original discovery of the composition of gunpowder, or merely devised its application to war and the chase, is equally uncertain; but the latter is more probable, as gunpowder is supposed to have been known in 1330, and before other dates assigned to his alleged discovery; and he may have acquired information about it from manuscripts in the monasteries.

A monument to his memory was erected at Freiburg in 1853.

SCHWARZ, **Christian Friedrich**, a German missionary, born at Sonnenburg in Brandenburg in October, 1726, died in Tanjore, Hindostan, Feb. 13, 1798. He studied Tamil to aid Schultz in translating the Bible, was ordained at Copenhagen in 1749, and in 1750 sailed for Tranquebar. He removed thence to Trichinopoly, and finally to Tanjore, where he spent the last 20 years of his life. The rajah of Tanjore committed to him the education of his son and successor; and Hyder Ali received him as an ambassador after refusing all others. When the latter invaded the Carnatic, and the inhabitants and garrison of Tanjore were reduced almost to starvation, Schwarz induced the native farmers to bring in their cattle, pledging his word for their payment. After his death the rajah of Tanjore and the East India company each erected a monument to his memory.

SCHWARZBURG-RUDOLSTADT, a principality of the German empire, bordering on the Saxon duchies, the Prussian province of Saxony, and Schwarzburg-Sondershausen; area, 364 sq. m.; pop. in 1871, 75,523, nearly all Lutherans. It is divided into the upper lordship of Rudolstadt, which is mountainous, and the lower of Frankenhausen, which is less so. The main rivers are the Saale, Ilm, and Schwarza. The principal products are minerals and timber. Horses and cattle abound. Linen, woollen, and other goods are manufactured. The diet consists, according to the modified constitution of 1870, of 16 members, 4 chosen from the largest taxpayers and 12 elected by the people. The principality has one vote in the German Reichstag. The local princes, whose house is one of the oldest in Thuringia, became in 1699 independent of Saxony. The reign of the present prince, George Albert (born 1838), began in 1869. Capital, Rudolstadt.

SCHWARZBURG-SONDERSHAUSEN, a principality of the German empire, bordering on Prussian Saxony, the Saxon duchies, and Schwarzburg-Rudolstadt; area, 323 sq. m.; pop. in 1871, 67,191. It consists of the upper lordship of Arnstadt and the lower of Sondershausen; is mountainous in the S. part, and is watered by the Gera, Ilm, and other tributaries of the Saale. The main products are flax, timber, and minerals. Trade and industry have lately much increased through railway traffic. The prince names 5 members for the local diet, and the other 10 are chosen half by the largest taxpayers and half by general election. In the German Reichstag the principality has one vote. The reigning prince, Gunther Frederick Charles (born 1801), succeeded in 1835 on the resignation of his father. Capital, Sondershausen.

SCHWARZENBERG, **Friedrich Johann Joseph Celestianus von**, an Austrian cardinal, born in Vienna, April 6, 1809. He was made bishop of Salzburg Feb. 1, 1836, was proclaimed cardinal Jan. 24, 1842, and was promoted to the pri-

matial see of Prague Dec. 13, 1849. At the beginning of the Vatican council he signed the petition to the pope, drawn up by Cardinal Rauscher, praying that the doctrine of pontifical infallibility should not be discussed in the council; he made a discourse against the opportuneness of a dogmatic definition, but afterward accepted the decision of the council.

SCHWARZENBERG. I. Karl Philipp, prince, and duke of Krumau, an Austrian field marshal, born in Vienna, April 15, 1771, died in Leipsic, Oct. 15, 1820. He distinguished himself under Lacy in the war against the Turks, and also in the war against France. In 1794, at the battle of Cateau-Cambrésis, he cut his way at the head of his regiment and of 12 British squadrons through a line of 27,000 men. After the victory of Würzburg he was made major general, and in 1799 lieutenant field marshal; and in 1805 he commanded the Austrian right wing at Ulm. In 1808 he was appointed ambassador at St. Petersburg. He was present in the following year at the battle of Wagram, commanding the rear guard on the retreat, and after the peace of Vienna was sent to France as ambassador. There he conducted the negotiations in regard to the marriage of Napoleon with the archduchess Maria Louisa. He gave a ball in honor of it, which was broken up by a terrible conflagration resulting in the death of his sister-in-law the princess Pauline of Schwarzenberg, and the empress barely escaped with her life. In the campaign of 1812 against Russia, he commanded the Austrian contingent of the French army; and at the request of Napoleon the emperor Francis created him a marshal. In 1813 he was in Paris attempting to negotiate a peace between France and Russia. After his return he received the supreme command of the allied troops of Russia, Austria, and Prussia, gained the victory of Leipsic, and marched to Paris. On the return of Napoleon from Elba he received the command of the allied army on the upper Rhine, and a second time entered France after the battle of Waterloo. At the end of the campaign he was made president of the imperial military council, and was presented with several estates in Hungary. **II. Felix Ludwig Johann Friedrich**, prince of, an Austrian statesman, nephew of the preceding, born at the estate of Krumau in Bohemia, Oct. 2, 1800, died in Vienna, April 5, 1852. He became a captain of cuirassiers, and in 1824 went to St. Petersburg as attaché to the Austrian embassy. Two years later he was sent with despatches to London, joined the extraordinary mission to Brazil under Baron Neumann, and after his return to Europe was employed in diplomacy. While in London in 1830, he eloped with Lady Ellenborough, who was divorced from her husband. He became a major general in 1842, and in 1848 commanded a brigade under Nugent in Italy, and was made lieutenant field marshal before the battle of Custoza. He was recalled

to Austria by the troubles in the capital, and after the suppression of the October revolution in Vienna was made prime minister, which post he retained till his death. During his term of office the aid of Russia was obtained for the suppression of the Hungarian revolution, and a daring policy pursued in Germany. (See AUSTRIA.) He died of apoplexy.

SCHWARZWALD. See BLACK FOREST.

SCHWEGLER, Albert, a German historian, born at Michelbach, Württemberg, Feb. 10, 1819, died in Tübingen, Jan. 5, 1857. He studied at Tübingen, and became a follower of Baur and one of the principal exponents of the Tübingen school; but on account of the objections of the authorities to his *Montanismus* (1841), he abandoned theology, and in 1843 became *Privatdocent* of philosophy and classical philology at Tübingen, and in 1848 professor. Subsequently he filled the chair of history there. His principal works are: *Das nach-apostolische Zeitalter* (2 vols., 1846); editions of the Clementine homilies (1847) and of Aristotle's "Metaphysics," with German annotated translations (4 vols., 1847-'8); *Geschichte der Philosophie* (1848; 7th ed., 1870; English translation by Prof. J. H. Seelye, New York, 1856); an edition of the church history of Eusebius (2 vols., 1852); *Römische Geschichte*, extending only to the Licinian laws (3 vols., 1853-'8; 2d ed., 1867); and the posthumous *Geschichte der griechischen Philosophie*, edited by Köstlin (1859; 2d ed., 1870).

SCHWEIDNITZ, a fortified town of Prussia, on the Weistritz, in the province and 30 m. S. W. of the city of Breslau; pop. in 1871, 16,998. During the seven years' war Schweidnitz was repeatedly besieged by the Prussians and Austrians, the Prussian siege of 1762 being the most memorable. In 1807 it was taken by the French, who demolished the outer defences.—The former principality of Schweidnitz was ruled by local princes from 1290 to 1353; and it was afterward a crownland of Bohemia till 1741, when it was incorporated with Prussia.

SCHWEIGGER, Johann Salomon Christoph, a German physicist, born in Erlangen, April 8, 1779, died in Halle, Sept. 6, 1857. He studied at Erlangen, was *Privatdocent* there from 1800 to 1802, became professor of mathematics and physics at the gymnasium of Baireuth in 1802 and at the polytechnic institute of Nuremberg in 1811, and from 1819 was professor of physics and chemistry at Halle. After the announcement of Oersted's discovery of electromagnetism in 1819-'20 he devised an electromagnetic multiplier (see GALVANISM, vol. vii., p. 593), which bears his name. He contributed to Gehlen's *Journal der Chemie, Physik und Mineralogie* (vol. vii., 1808) an article entitled *Ueber Benutzung der magnetischen Kraft bei Messung der elektrischen* (published separately in Berlin in 1874), containing statements in regard to electro-magnetism from which his friends claim for him the credit of being the original discoverer.

SCHWEINFURT, or *Schweinfurth*, a town of Bavaria, in the district of Lower Franconia, on the Main, 23 m. N. N. E. of Würzburg; pop. in 1871, 10,325, chiefly Protestants. It is enclosed by old walls, and has a Catholic and several Lutheran churches, a gymnasium, and manufactures of leather, linen, and woollen cloths. Schweinfurt was a free imperial city from 1130 to 1803.

SCHWEINFURTH, Georg August, a German traveller, born in Riga, Sept. 29, 1836. He studied in Heidelberg, Munich, and Berlin, devoting himself especially to botany, and set out in 1864 on a journey through the valley of the Nile and the Egyptian coast lands on the Red sea, for the purpose of investigating the flora and fauna in those regions. He returned to Cairo in 1865, and made a second expedition up the Blue Nile as far as Khartoom. Reaching Europe again in July, 1866, he spent two years in Berlin in classifying and describing the botanical, zoological, and geological specimens collected in his travels. Going again to Khartoom in 1868, he explored the White Nile and the Gazelle, and penetrated inland to the west as far as lon. 26° E., and to the south as far as Munza, about lat. $3^{\circ} 30'$ N., through the little known regions of the Shellooks, Dinkas, and Niam-Niam, and the kingdom of Monbuttoo. These travels occupied three years, and after spending a season in Sicily, Malta, and Rome, he arrived in Germany in July, 1872. In 1875 the khedive made him president of an Egyptian geographical society, which is to issue a monthly journal. He has published *Versuch einer Vegetations-skizze* (Berlin, 1862); *Plantæ quædam Niloticæ* (1862); *Beitrag zur Flora Aethiopiens* (1867); *Reliquiæ Kotschyaræ* (1868); and *Im Herzen von Afrika* (2 vols., Leipsic, 1874; English translation, "The Heart of Africa," 1874). This work contains the first trustworthy account of the pygmy race of Africa, the Akka. (See PYGMY.)

SCHWEINITZ, Lewis David von, an American botanist, born in Bethlehem, Pa., Feb. 13, 1780, died there, Feb. 8, 1834. He was educated in Germany, and remained there till 1812, when he went as a Moravian minister to Salem, N. C., and in 1821 to his native town. He described nearly 1,400 new species of plants, of which more than 1,200 were of North American fungi, previously little studied. His works include *Conspectus Fun-*

gorum Lusatiæ (Leipsic, 1805); *Synopsis Fungorum Carolinæ Superioris*, edited by Dr. Schwegrichen (1818); *Specimen Floræ Americæ Septentrionalis Cryptogamicæ* (Raleigh, 1821); "Monograph of the Linnæan Genus *Viola*" (published in Silliman's "Journal," 1821); "Catalogue of Plants collected in the N. W. Territory by Say" (Philadelphia, 1824); "Monograph upon the American Species of the Genus *Carex*" (New York, 1825); and *Synopsis Fungorum in America Boreali Media Degentium* (Philadelphia, 1832).

SCHWENKFELD, Kaspar von, the founder of a religious sect, born in Ossig, Silesia, in 1490, died in Ulm about 1561. He was a nobleman of ancient lineage, councillor to the duke of Liegnitz and an eager advocate of the reformation. He differed with Luther especially on the deification of the body of Christ; and he was persecuted by both Roman Catholics and Protestants. His character was never impugned by any of his opponents, and his numerous writings (including *Bekanntnus und Rechenschaft von den Hauptpunkten des christlichen Glaubens*, 1547, and nearly 100 treatises) are among the most valuable sources of the history of the reformation. His adherents, called Schwenkfelders or Schwenkfeldians, lived mostly in Silesia. In 1734 a considerable number emigrated to Pennsylvania, where they settled principally in Montgomery, Berks, Bucks, and Lehigh counties. They still number there about 300 families and 800 members, and have five churches and school houses.—See *Ausführliche Geschichte Kaspar von Schwenkfeld's*, &c. (Lauban, 1861).

SCHWERIN, a town of Germany, capital of the grand duchy of Mecklenburg-Schwerin, on



Palace of Schwerin.

the W. side of the lake of the same name, 18 m. S. of its seaport Wismar; pop. in 1871, 26,804. It consists of the Altstadt and the

Neu-, Vor-, and Paulstadt, the last three being of modern origin and the most attractive. The grand ducal palace is an imposing building on an island in the lake, on the same spot where there was a castle in the 12th century, which was restored by Wallenstein. The new palace was begun in 1845 and finished in 1858, and is surrounded by beautiful pleasure grounds. The *Dom* or cathedral, recently restored, is a fine Gothic structure. Tobacco manufacture is the principal industry. It is a place of great antiquity, and is mainly indebted for its embellishments to the grand duke Paul Frederick (1837-'42), whose statue by Rauch stands in front of the theatre.

SCHWERIN, Kurt Christoph von, count, a German field marshal, born in Swedish Pomerania, Oct. 16, 1684, killed at the battle of Prague, May 6, 1757. He was an ensign in the Dutch army at the age of 16, fought under Marlborough and Eugene, and entered the service of Prussia in 1720, with the rank of major general. On the accession of Frederick the Great (1740) he was made field marshal with the title of count, and in 1741 gained the decisive battle of Mollwitz, by which the Prussians secured possession of Silesia. In 1744 he took Prague, and in the seven years' war fell in the great battle before that city.

SCHWIND, Moritz von, a German painter, born in Vienna in 1804, died in Munich, Feb. 8, 1871. He studied under Cornelius, and in 1839 designed frescoes for the art hall at Carlsruhe. In 1847 he became professor at the academy of Munich. His best known productions are the designs for St. Michael's church, London, and for the Vienna opera house. He excelled in fairy and fanciful subjects. His best and last work was "The Beautiful Melusina."

SCHWYTZ, a N. E. canton of Switzerland, bordering on the cantons of Zürich, St. Gall, Glarus, Uri, Unterwalden, Lucerne, and Zug; area, 350 sq. m.; pop. in 1870, 47,705, nearly all Germans and Roman Catholics. It is traversed by chains of mountains with offsets in every direction. The Rossberg, which is partly in this canton and partly in Zug, is 5,188 ft. above the sea; in 1806 a portion of it fell with most destructive effect. The other points of greatest elevation are the Drusberg, in the east, 7,430 ft.; the Mythen, near the centre, 6,250 ft.; and the Rigi, in the west, 5,902 ft. The whole canton belongs to the basin of the Rhine, and the drainage flows into the Limmat and the lakes of Zürich on the north and Lucerne on the west, mainly by the rivers Sihl and Muotta. The minerals are not valuable; there is some iron, and formerly the sands were washed for gold. The climate is milder than in many other parts of Switzerland, as none of the mountains rise above the limit of perpetual snow. Very little of the soil is arable; the country is almost wholly pastoral, and the finest cattle in Switzerland are reared here. Schwytz is one of the

three original cantons that resisted Austria and formed the primitive confederation; and it gave a name to the whole country. The inhabitants made spirited efforts to resist the French in 1798, and suffered severely in 1799, when the war was carried into their country. —**SCHWYTZ**, the capital, is built at the foot of the rocky eminences Kaken and Mythen, 55 m. E. by N. of Bern; pop. in 1870, 6,154. In the council house are portraits of 43 grand bailiffs of the canton, dating from 1534. Other places of historical interest are Küssnacht, Brunnen, and Einsiedeln.

SCIACCA, a town of Sicily, on the S. W. coast, in the province and 30 m. N. W. of Girgenti; pop. about 14,000. It is on the verge of a lofty cliff, is surrounded by walls with towers, and has a cathedral with a famous echo, and numerous other churches. Pottery is manufactured. It was anciently called *Thermæ Selinuntiae*, from the hot sulphur and saline springs at the foot and on the summit of Mt. San Calogero, outside the present walls, and from its vicinity to Selinus.

SCIATICA. See NEURALGIA.

SCIGLIO, or *Scilla* (anc. *Scyllæum*, or *Scylla*).

I. A promontory of S. Italy, in Calabria Ulteriore, on the strait of Messina, in lat. 38° 14' 30" N., lon. 15° 45' E. It is a bold headland, 200 ft. high, the rocks at the base being deeply scooped out by the action of the waves, and is crowned by an ancient castle. It is in the narrowest part of the strait, opposite the rocks and shoals of Charybdis, and was the terror of ancient mariners. (See CHARYBDIS AND SCYLLA.) **II.** A town on the promontory, 9 m. N. by E. of Reggio; pop. about 6,700. It has extensive silk manufactures, an active commerce, and considerable fisheries, and its wine is celebrated. It is said to have been founded by Anaxilus, tyrant of Rhegium. It was nearly destroyed and half its inhabitants were lost by an earthquake, Feb. 5, 1783.

SCILLY ISLANDS, a group at the W. entrance of the English channel, belonging to the county of Cornwall, about 30 m. W. S. W. of Land's End; lat. of the lighthouse on St. Agnes, 49° 53' N., lon. 6° 20' W.; pop. in 1871, 2,090. The group is circular, about 30 m. in circumference, and contains about 140 islands and islets, besides numerous rocks. St. Mary's, Treco, St. Martin's, St. Agnes, and Bryher are the only ones with more than 100 inhabitants. They have steep and bold shores, on which many ships have been wrecked; but between the islands the water is shallow, and some of them are connected by strips of land at low water. The inhabited islands have an aggregate area of about 3,500 acres, but the soil is generally barren, and trees grow only in sheltered spots. Some oats and potatoes are raised on St. Mary's, and there is a little pasture land on the others. The inhabitants are mostly fishermen, pilots, and sailors. The local government consists of a court of 12 principal inhabitants presided over by a mili-

tary officer. The largest of the group is St. Mary's, with the capital, Hughtown. On the W. side of the island is Star Castle, and a garrison with numerous batteries.—The Scilly islands are generally supposed to be the Cassiterides or Tin islands of the ancients; but as that metal is not now found upon them, it is thought that the western extremity of Cornwall was also included under that name. The group was sometimes used by the Romans as a place of banishment, and was called by them *Sellinæ* or *Silurum insulæ*. They were annexed to the English crown in the 10th century.

SCINDE. See **SINDE**.

SCINDIA, or **Sindia**. See **GWALIOR**.

SCIO, **Skio**, **Chio**, or **Khio** (anc. *Chios*; Turk. *Sakis-Adassi*), an island of Asiatic Turkey, in the Grecian archipelago, off the coast of Asia Minor, from which it is separated by the strait of Scio, 4 m. wide in its narrowest part; area, about 400 sq. m.; pop. about 50,000, most of whom are Turks. The surface is rocky and uneven, being traversed by limestone ridges, and the scenery is picturesque. There are beautiful valleys and several small streams, but much of the irrigation is by means of water obtained from wells; and the country presents a scene of perpetual verdure, though only a small part of the land is arable. The chief productions are silk, cotton, wool, fruit, oil, and gum mastic, the last of which is the staple of the island. The wine of Chios was highly esteemed in antiquity, and still enjoys some repute.—Chios is said to have been anciently peopled by Tyrrhenian Pelasgians and Leleges, after whom it was occupied by an Ionian colony; and the chief city, also called Chios, claimed the honor of being the birthplace of Homer. It was invaded by the Persians and devastated in 494 B. C. After the battle of Mycale (479) it became a member of the Athenian league; in 358 it recovered its independence; in 201 it was taken by Philip V. of Macedon, and it afterward became subject to Rome. In the early part of the 14th century the Turks captured the capital and massacred the inhabitants. From 1346 to 1566 it was in the hands of the Genoese. It then again fell under the dominion of the Turks, and, excepting a short interval during which it was subject to Venice, it has since been in their possession. During the Greek revolution its inhabitants rose against the Turks (1822), but were soon subdued. Within two months 23,000 Sciotes, without distinction of age or sex, were put to the sword, 47,000 were sold into slavery, and 5,000 sought safety in other parts of Greece. By the end of August the former Christian population of nearly 104,000 was reduced to 2,000. In June, two months after the massacre, Canaris attacked the Turkish fleet in the harbor of Scio with fire ships, and destroyed the vessel of the capudan pasha, who perished in the flames. In 1827 a Greek force under Col. Fabvier, a French philhellene, landed in Scio and attacked the Turk-

ish garrison, but were compelled to withdraw.—**SCIO**, or **Kastro**, the capital, is near the middle of the E. coast; pop. 14,500. It has a harbor, is defended by a castle, and manufactures velvet, silk, and cotton.

SCIOTO, a river of Ohio, rising in Hardin co., and flowing first nearly E. and then S. by E. to Columbus, thence S. to the Ohio, which it joins at Portsmouth. It is about 200 m. long, and navigable 130 m. Its principal tributaries are the Olentangy or Whetstone river, which unites with it at Columbus, and Darby, Walnut, and Paint creeks. The Ohio and Erie canal follows its lower course for 90 m. The Scioto valley is famed for its fertility and wealth.—The Little Scioto is a small stream which flows into the Ohio 8 m. above Portsmouth.

SCIOTO, a S. county of Ohio, bounded S. by the Ohio river and watered by the Scioto and Little Scioto rivers and branches; area, about 500 sq. m.; pop. in 1870, 29,302. The surface is uneven and the soil fertile. In the E. part of the county iron is plentiful, and large furnaces and foundries are in operation. The Portsmouth branch of the Marietta and Cincinnati railroad traverses it. The chief productions in 1873 were 73,365 bushels of wheat, 818,603 of Indian corn, 116,569 of oats, 60,701 of potatoes, 7,179 tons of hay, 2,619 lbs. of tobacco, 204,384 of butter, and 11,232 of wool; 91,266 bushels of coal and 27,576 tons of iron ore were mined, and 14,876 tons of pig iron manufactured. In 1874 there were 5,579 horses, 12,886 cattle, 6,979 sheep, and 13,976 swine. In 1870 there were 8 manufactories of carriages and wagons, 5 of charcoal, 10 of cooperage, 7 of furniture, 2 of forged and rolled iron, 1 of nails and spikes, 6 of pig and 3 of cast iron, 4 of tanned and 2 of curried leather, 1 of engines and boilers, 3 of marble and stone work, 6 saw mills, 2 planing mills, 2 flour mills, and 2 woollen mills. Capital, Portsmouth.

SCIPIO, a Roman patrician family belonging to the Cornelia gens. The tomb of the Scipios, discovered in 1616 and excavated in 1780, is near the modern gate of St. Sebastian. The most distinguished members of the family are:
I. Publius Cornelius Scipio Africanus Major, a Roman general, born about 234 B. C., died about 183. He was the son of P. Cornelius Scipio, who with his brother Cneius Cornelius Scipio was defeated and killed in Spain by the Carthaginian generals Mago and Hasdrubal (211). He is first mentioned at the battle of the Ticinus in 218. In 216 he was at the battle of Cannæ, and Livy and other writers ascribe to his influence the prevention of the scheme entertained by the Roman nobles after that disastrous day of fleeing from Italy; but better authorities attribute this to Varro, the defeated general. In 212 he was made curule ædile. After the defeat and death of his father in Spain, being then 24 years of age, he offered to take command of the Roman armies in that province as proconsul. He arrived in Spain in the summer of 210, and found the three Car-

thaginian generals, who were on ill terms with each other, in different parts of the peninsula. At the head of 25,000 foot and 2,500 horse, he made a rapid march from the Iberus (Ebro) to New Carthage (Cartagena), the centre of Punic power in Spain, in which were the Carthaginian treasure, magazines, and hostages. The city, remote from all succor, and ill defended by a garrison of 1,000 men, was soon taken. The captive Spaniards were dismissed with kindness, and in this manner Scipio began his work of conciliating the natives. He returned to Tarraco, and, strengthened by an alliance with several of the Spanish tribes, in 209 took the field against Hasdrubal, over whom he is said to have gained a great victory at Bæcula, but failed to prevent him from marching to the assistance of his brother Hannibal in Italy. In 207 Scipio, at the head of 45,000 foot and 3,000 horse, defeated a superior force of the enemy under Hasdrubal, the son of Gisco, and Mago, near a town called Silpia or Elinga, and put an end to the power of the Carthaginians in Spain. Scipio, anxious to carry the war into Africa, gained over Masinissa, the Numidian ally of the Carthaginians, who had come to Spain; and to win the support of Syphax, the king of the Massæsylians in Numidia, he crossed over with only two quinquiremes to negotiate with him personally. There he found Hasdrubal, the son of Gisco, present with a similar intention, and the Carthaginian prevailed principally through the charms of his daughter Sophonisba. On his return Scipio found Spain in a general revolt, but put it down in a short campaign marked by the merciless treatment of Illiturgi, and the desperation of the inhabitants of Astapa, who fell to a man. He quelled a mutiny which had broken out while he was confined by a severe illness in the Roman camp on the Suero (Jucar), and defeated the Spaniards, who had taken the same opportunity to revolt. In a short time the Carthaginians abandoned Spain entirely, and in 206 Scipio handed over the government to his successor, and returned to Rome. There he was received with enthusiasm, and was elected consul for the following year. He had now an opportunity of attacking the Punic power in Africa; but the senate would only allow him to go to Sicily, with the right of crossing into the Carthaginian territory if advantageous, but denied him an army. Volunteers, however, flocked to his standard, and in 204 he sailed with his army from Lilybæum, and landed near Utica, where he was joined by Masinissa. The Romans began the siege of Utica, but the approach of a vast Carthaginian and Numidian army compelled them to abandon the project. During the winter he amused Syphax with negotiations in regard to peace, but early in 203 by a stratagem burned the camps and almost annihilated the armies opposed to him. The Carthaginians collected another army, which suffered another total defeat, and thereupon they recalled Hannibal

and Mago from Italy, and made a truce. Hannibal was not indisposed to peace, but was compelled to take the field, and the two armies met near Zama (202). A complete victory for the Romans ended the second Punic war and the power of Carthage. Scipio returned to Rome in 201, and was welcomed with extraordinary enthusiasm. The surname of Africanus was given him, but he declined the distinction of statues in the public places, and took no part in the government for a few years. He was censor in 199, and consul a second time in 194, and several times received the title of *princeps senatus*. In 193 he was one of the three commissioners sent to mediate between Masinissa and the Carthaginians. In 190 he accompanied his brother Lucius (afterward known as Asiaticus) as *legatus* in the war against Antiochus the Great of Syria. On their return to Rome in 189, after the close of the war, his brother was accused of taking bribes from Antiochus, and appropriating the public moneys to his own use. In 187, at the instigation of M. Porcius Cato, Lucius was required by the tribunes to give an account of the sums he had received. He prepared to do so, but Africanus snatched the papers from his hands and tore them up before the senate. During the same year Lucius was tried, found guilty, and carried to prison, but was rescued by his brother. The tribune, Tiberius Gracchus, released Lucius from his sentence of imprisonment, and his friends paid the fine. His adversaries now ventured to attack Africanus himself. Scipio made no defence, but simply recounted his services to the state, and thus triumphed over his enemies. He spent the remainder of his days on his estate at Liternum. The accounts of Scipio's life are confused and contradictory. Cornelia, the mother of the Gracchi, was his daughter. **II. Publius Cornelius Scipio Æmilianus Africanus Minor**, a Roman general, born about 185 B. C., died in 129. He was the son of L. Æmilius Paulus, the conqueror of Macedon, and was adopted by P. Scipio, the son of Africanus Major. He was with his father at the battle of Pydna in 168, in 151 went as military tribune to Spain, where he gained a high reputation, and in 150 was sent to Africa to obtain elephants from Masinissa. In 149, on the breaking out of the third Punic war, he accompanied the army to Africa as military tribune, and saved it from the disasters which would naturally have resulted from the incapacity of Manilius. In 147 he was elected consul, and in the spring of 146 he took the city of Carthage, and ended the third Punic war. He returned to Rome, celebrated a triumph, and received the surname of Africanus. In 142 he was made censor, and endeavored to repress the growing luxury of the Roman people. In 139 he was tried on the charge of *majestas*, but was acquitted. After this he went on an embassy to Egypt and Asia, and in 134 he was elected to the consulship in order to carry on the war in Spain. Having brought the disor-

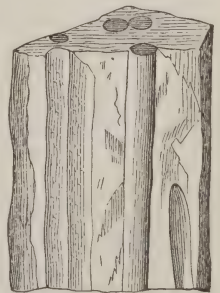
ganized troops into a proper state of discipline, he took Numantia in 133, after a memorable siege and desperate defence, ending in the self-immolation of nearly all its inhabitants; for this he received the surname of Numantinus. During this time the civil troubles in Rome had culminated in the murder of Tiberius Gracchus, whose sister Scipio had married; a deed which he approved, notwithstanding their relationship. The people were consequently estranged from him, and in 129, on the day following his speech against the agrarian law, he was found dead in his chamber. He was one of the most accomplished literary men of his time, well acquainted with Greek philosophy and literature, and the friend and patron of the historian Polybius, the philosopher Panætius, and the poets Lucilius and Terence. **III. Quintus Cæcilius Metellus Pius**, a Roman general, killed himself in 46 B. C. He was the son of P. Cornelius Scipio Nasica and the adopted son of Metellus Pius, and in consequence he has been called P. Scipio Nasica, or Q. Metellus Scipio. In 63 B. C. he came to Cicero by night to inform him of the conspiracy of Catiline. He became tribune in 60, was accused of bribery by his opponent and defended by Cicero, and in 53 was a candidate for the consulship and one of the leaders of the Clodian mob opposed to Milo. When the senate allowed Pompey to be made sole consul, that leader, who was his son-in-law, chose him (August, 52) as his colleague. He labored assiduously to destroy the power of Cæsar, and the breach between the aristocratic and democratic parties at Rome and the civil war were largely due to him. He grossly misgoverned the province of Syria, assigned to him, joined Pompey in Greece after Cæsar's repulse at Dyrrachium, and after the battle of Pharsalia fled to Africa, where he took command of the army of Attius Varus, and where he also practised extortion and oppression. In December, 47, Cæsar crossed the Mediterranean, and in April, 46, routed the forces of Scipio and Juba, king of Numidia, at the battle of Thapsus; and Scipio stabbed himself and sprang into the sea to escape capture.

SCIRE FACIAS, in law, a judicial writ founded upon some record, and requiring the person against whom it is brought to show cause why the person bringing it should not have the advantage of such record, or (in the case of a *scire facias* to repeal letters patent) why the record should not be annulled and vacated. It is so called from the words of the writ (when in Latin, as all writs originally were) to the sheriff: *Quod scire facias præfato*, &c., and can only issue from the court having the record upon which it is founded. It is most commonly used for the purpose of reviving a judgment after the lapse of a certain time, or on a change of parties, or otherwise to have execution of the judgment, in which cases it is merely a continuation of the original action. It is used more rarely as a method of proceeding against a debtor's bail, when the original debt-

or has absconded, commanding them to show cause why the plaintiff should not have execution against them for his debt or damages and costs; and also on a recognizance to the commonwealth, as well as to obtain execution against the indorser of an original writ, in case of the avoidance or inability of the plaintiff to pay the costs recovered against him by the defendant. It also lies where an execution has been returned into court as satisfied by means of a levy, but it afterward appears that the lands levied upon did not belong to the judgment debtor, or the levy was otherwise imperfect or insufficient; and in England it may be obtained by the patron or owner of an advowson for the purpose of removing a usurper's clerk improperly admitted by the bishop. It is further used as a means of repealing letters patent which have been obtained by fraud or issued improvidently, and in this case it is an original proceeding or action.—The action of *scire facias* is the proper method of proceeding to ascertain judicially and enforce the forfeiture of a charter by a corporation for default or abuse of power, when such corporation is a legally existing body capable of acting, but which has abused its power; though when the corporation is a body *de facto* only, and on account of a defect in the charter or for any other reason cannot legally exercise its powers, the proceeding is by *quo warranto*.

SCLOPIS DE SALERANO, Paolo Federigo, count, an Italian jurist, born in Turin in 1798, died March 8, 1878. He studied law at Turin, distinguished himself in drawing up the Sardinian civil code of 1837 and in other departments of jurisprudence, became in 1848 minister of justice and ecclesiastical affairs, and presided over the committee for framing more liberal laws for the press; but he soon exchanged his place in the cabinet for the chamber of deputies. At the close of 1849 he took his seat in the senate, of which he was president till 1861, and subsequently held the same office in the senate of Italy till 1864. In 1872 he was appointed by Victor Emanuel arbitrator at Geneva on the part of Italy under the treaty of Washington, and he was made president of the court of arbitration. The American government sent him a service of silver plate in 1874. His principal work is a history of Italian legislation (3 vols., Turin, 1840-'57).

SCOLITHUS, a supposed fossil burrowing worm of the *arenicola* family, whose long vertical holes are very common in the Potsdam sandstones, of the lower Silurian period. These holes, now filled with rocky material, were for a long time believed to be the re-



Scolithus linearis.

mains of a fucoid plant, and afterward until recently to indicate the existence of a long marine worm, which inhabited the sands not far below tide level. The most common form has been named *S. linearis*, and, whatever it be, is one of the earliest fossils. Since attention has been paid to the habits of sponges, especially to those of *cliona* and its allies, which mine and perforate shells, some palæontologists are disposed to attribute the scolithus marks to these rather than to marine worms. Sponges are known to have existed at the period of the Trenton limestone, next above the Potsdam sandstone, and it is highly probable that most if not all of these burrows are due to ancient mining sponges.

SCOPAS, a Greek sculptor, born in the island of Paros, flourished during the first half of the 4th century B. C. He was a contemporary of Praxiteles, and with him stands at the head of the later Attic school of sculpture. Among his most famous works are the slabs from the mausoleum of Halicarnassus representing a battle of Amazons. The celebrated group of Niobe and her children in the Uffizi gallery, Florence, and the Venus of Milo in the Louvre, are also attributed to Scopas, though the latter probably belongs to the school of Phidias. He was employed on the temples of Athena Alea in Arcadia and of Diana at Ephesus. His masterpiece, according to Pliny, was a group representing Achilles conducted to the island of Leuce by sea divinities.—See *Skopas's Leben und Werke*, by Ulrichs (Greifswald, 1863).

SCORESBY. **I. William**, an English navigator, born at Cropton, Yorkshire, May 3, 1760, died in 1829. He was bred a farmer, and at the age of 29 entered on a seafaring life; and he became an adventurous and successful whaling master, having held command in 30 voyages. He made numerous improvements in whaling apparatus and operations, and invented the observatory attached to the maintopmast, called the "round topgallant crow's nest," which was generally adopted by arctic navigators. **II. William**, an English arctic explorer and clergyman, son of the preceding, born at Cropton, Oct. 5, 1790, died in Torquay, March 21, 1857. At the age of 10 he ran away to sea in one of his father's ships, and in his 16th year attained the rank of chief mate. He was second officer of the *Resolution*, commanded by his father, which in 1806 sailed to lat. 81° 30', the northernmost point that had then been reached. After several years spent in study, partly at the university of Edinburgh, he became in 1810 captain of the *Resolution*. Some communications which he made to Sir Joseph Banks resulted in the series of explorations in the north which have distinguished the present century. He was the first to attempt scientific observations on the electricity of the atmosphere in high northern regions. He explored in the ship *Baffin* in 1822 the E. coast of Greenland, and after his return devoted himself to study, graduating at Cambridge as bachelor of

divinity in 1834, and subsequently received the degree of D. D. After serving as chaplain of the mariners' church in Liverpool, he was appointed in 1839 vicar of Bradford in Yorkshire. Here he labored until his failing health obliged him to retire to Torquay, where he engaged in scientific and philanthropic labors. He visited the United States in 1847, and shortly before his death made a voyage round the world, reaching home Aug. 14, 1856. He was a member of the royal society. His principal works are: "An Account of the Arctic Regions" (2 vols. 8vo, 1820); "Journal of a Voyage to the Northern Whale Fishery" (1823); "Discourses to Seamen" (1831); "Magnetical Observations" (3 parts, 8vo, 1839-'52); "American Factories and their Female Operatives" (1848); "Zoistic Magnetism" (1849); "Sabbaths in the Arctic Regions" (1850); "The Franklin Expedition" (1850); "My Father" (1851); and "Voyage to Australia and round the World for Magnetical Research," edited by Archibald Smith (1859). His life has been written by his nephew, R. E. Scoresby-Jackson (London, 1861).

SCORPION, an articulate animal of the class *arachnida* or spiders, division *pulmonaria* or those which breathe by air sacs, order *pedipalpi*, and genus *scorpio* (Linn.). The body is long, the head and thorax in a single piece, the thorax and abdomen intimately united and followed by six joints of nearly equal breadth, and then by six others very narrow, and forming what is called the tail; the last joint ends in a sharp curved sting connected with a gland secreting an oily, whitish, poisonous fluid, which is discharged by two small openings near the end; the body is clothed with a firm, coriaceous skin composed of chitine. The mandibles, according to Siebold, are wanting, the parts usually called such being only antennæ transformed into prehensile and masticatory organs; the cheliceres have three joints, move vertically, and under them have the first pair of jaws changed into long prehensile palpi, like extended arms, ending in a didactyle claw or pincer, as in the lobster, endowed with a delicate sense of touch; there are eight legs, three-jointed, ending each in a double hook; the eyes are six or eight, one pair of which is often median and larger than the others; at the base of the abdomen are two laminated organs, called combs. On the lower and lateral parts of the abdomen are eight spiracles or stigmata, opening into as many pulmonary sacs, each enclosing 20 delicate laminae for respiratory purposes; the heart consists of eight chambers, and at each end is prolonged into an arterial trunk; there is also a venous system; the blood is colorless, and contains a few cells and granules; no blood vessels have been discovered on the pulmonary laminae, and the blood is probably effused into the parts surrounding these sacs or lungs. The intestine is straight and narrow, with the anal opening on the penultimate caudal segment; the liver is very

large, and salivary glands distinct; the urinary organs are ramified tubes opening into the cloaca; the reproductive organs are double, at the base of the abdomen, and the sexes distinct; the two ventral nervous cords proceeding from the head form eight ganglia, the last four belonging to the tail. Scorpions feed on insects, which they hold by their palpi and sting to death, and then suck the blood; they are generally found in dark places in warm climates, and in some tropical parts of the old world render whole districts uninhabitable; they live on the ground, concealing themselves under stones, in ruins, in the interior of houses, and even in beds; they run very fast, keeping the tail elevated and ready to strike in any direction; the females are larger and less numerous than the males. Under certain circumstances they kill and devour their own progeny; they renew their skin several times, and can live very long without food; gestation is said to continue nearly a year, the young being born alive and in succession. The scorpion has been known from the earliest antiquity, as its place in the ancient zodiac proves; on Egyptian monuments Anubis is often represented as facing it as if to destroy its influence; Pliny gives a long account of the fabled powers of this animal.—The *S. Europæus* (Linn.), of southern Europe, is about an inch long, brown, with the feet and end of tail yellowish, and the palpi angular and heart-shaped; the female produces her young alive in succession, carrying them on her back for a few days and protecting them for about a month; it has six eyes, and nine teeth in the comb; its sting is harmless. The reddish scorpion (*S. occitanus*, Latr.) is a little larger, yellowish red, having the tail a little longer than the body with raised and finely notched lines; there are eight eyes, and more than 30 teeth in the comb; it is found in Spain and in N. Africa, but not with the preceding species; its sting is more to be feared, and may be dangerous to persons of weak constitution. The black scorpion (*S. afer*, Linn.) is blackish brown, with the claws



Black Scorpion (*Scorpio afer*).

rough and a little hairy and the anterior edge of the corslet strongly emarginated; there are eight eyes, and 13 teeth in the comb. It is found in Ceylon and other parts of the East Indies, and attains a length of 5 or 6 in.; the sting is sometimes fatal; the best remedy has

been found to be ammonia externally and internally, to neutralize the poison in the first case, and to guard against prostration in the other; other caustics and stimulants are used, and embrocations of various kinds of oil.—Nearly allied to the scorpions are the small book scorpions (*chelifer*), common in old books and neglected drawers. Small scorpions of the genus *bruchus* are found in our southern states.

SCOT, Reginald, an English author, died in 1599. He was educated at Oxford, but never took a degree, and passed the greater part of his life on his paternal estate near Smeeth in Kent. His "Discoverie of Witchcraft" (1584), in which he combats the popular opinion that the devil has the power of controlling the course of nature, was burned by the common hangman. James I. wrote his "Demonologie," he informs us, "chiefly against the damnable opinions of Wierus and Scot, the latter of whom is not ashamed in public print to deny there can be such a thing as witchcraft." Scot's work passed through three editions, and was translated into French and German. It is now exceedingly rare. In 1576 he published a "Perfect Platform of a Hop Garden."

SCOTER. See DUCK, vol. vi., p. 291.

SCOTLAND, a N. E. county of Missouri, bordering on Iowa, and intersected by the Wyconda, North Fabius, and Middle Fabius rivers; area, 400 sq. m.; pop. in 1870, 10,670, of whom 129 were colored. The surface is mostly prairie, and the soil fertile. It is traversed by the Missouri, Iowa, and Nebraska railroad. The chief productions in 1870 were 95,862 bushels of wheat, 30,035 of rye, 736,703 of Indian corn, 350,516 of oats, 45,246 of potatoes, 18,328 tons of hay, 10,972 lbs. of tobacco, 110,698 of wool, 327,960 of butter, 19,450 of honey, and 42,556 gallons of sorghum molasses. There were 5,898 horses, 919 mules and asses, 5,326 milch cows, 10,089 other cattle, 29,957 sheep, and 24,849 swine. Capital, Memphis.

SCOTLAND, the N. part of the island of Great Britain, and one of the three kingdoms of the British empire in Europe. It consists of a mainland and several groups of islands on the N. and W. coasts, and is bounded N. and E. by the North sea, S. by England, from which it is partly separated by the river Tweed, and the Irish sea, and W. by the Atlantic ocean. The mainland extends from lat. 54° 38' to 58° 40' 30" N., and from lon. 1° 45' to 6° 15' W. The extreme N. point of the islands is Unst, in the Shetland group, lat. 60° 50', and their most westerly point St. Kilda, in the Hebrides, lon. 8° 35'. The greatest length of the mainland, from Dunnet Head in the north to the Mull of Galloway in the south, is about 280 m.; and its greatest breadth, from Buchan Ness in the east to Ardnamurchan point in the west, about 170 m. The seacoast is extremely irregular, and so frequently and so deeply indented that its total extent is estimated at 3,000 m. By these indentations the breadth of the mainland is in some places greatly re-

duced, the distance between Alloa on the E. coast and Dumbarton on the W. coast being only 32 m., and between Loch Broom on the west and the Dornoch frith on the east only 24 m. On the north are the Orkney and Shetland islands, each group containing a population of about 31,000. On the west are the Hebrides or Western islands, divided into the outer and inner groups, with a total population of about 99,000. (See **HEBRIDES**, **ORKNEY ISLANDS**, and **SHETLAND ISLANDS**.) The island of Stroma lies between the Orkneys and the mainland. On the E. coast are May, Inchkeith, and Inchcolm islands, in the frith of Forth, and Inchcape or Bell Rock, off the frith of Tay.—The mainland of Scotland is geographically divided into two distinct regions, the highlands N. of the Grampian mountains, and the lowlands S. of that range; but there is scarcely any part of the country in which mountain ranges are not visible. There are five principal chains nearly parallel to each other, and having a general direction from N. E. to S. W. 1. The northern highlands commence in detached groups at the southern border of Caithness, and cover a large portion of the counties of Sutherland, Ross, and Inverness. They separate the streams which flow into the Atlantic from those that reach the North sea through the Moray frith. The principal summits are Ben Attow, 3,998 ft.; Ben Wyvis, 3,420; Ben Dearg, 3,656; Ben More, 3,230; Ben Clibrich, 3,165; and Morven, 2,331. 2. The Grampians, extending from Loch Awe on the Atlantic coast to near Stonehaven and Aberdeen on the coast of the North sea, with their ramifications, form in general the boundary between the highlands and lowlands, with a height of from 2,000 to 4,000 ft. The principal summits are Ben MacDhui, 4,296 ft.; Cairntoul, 4,245; Cairngorm, 4,090; Ben Avon, 3,826; Ben-y-Gloe, 3,690; Schiehallion, 3,564; and Ben Lomond, 3,192. Ben Nevis, N. of the W. extremity of the Grampians, and sometimes reckoned as belonging to them, is 4,406 ft. (according to older measurements 4,370 ft.) high. 3. The Ochil and Sidlaw range is separated from the Grampians by the valley of Strathmore, and consists of three small chains which extend from Forfarshire to Stirlingshire, and form the N. watershed of the basins of the rivers Tay, Forth, and Clyde. The Sidlaw hills extend from the river Dean to Perth on the Tay. Their highest summit, King's Seat, is 1,149 ft. high. The Ochils, between Stirling and the frith of Tay, attain an elevation of 2,350 ft., and the Campsie Fells in Stirlingshire are 1,500 ft. high. 4. The Lammermoor and Pentland range is separated from the third range by the frith of Forth, and forms the S. boundary of the Forth basin. This range consists of the Lammermoor hills between Haddington and Berwick, with an elevation of 1,750 ft.; the Moorfoot hills, a western continuation of the Lammermoors; the Pentland hills in Midlothian, 1,838 ft. high; and lastly Tinto

hill in Lanarkshire, 2,308 ft. high. 5. The Cheviot and Lowther range, or the southern highlands, extends from the English border to Loch Ryan, and separates the basins of the Clyde and the Tweed on the north from those of the Solway and the Tyne on the south. The highest summits of this range are Broadlaw, 2,741 ft.; Cheviot peak, 2,677; Hart Fell, 2,638; and Lowther hill, 2,520. The glens or deep and rocky valleys among the Scottish mountains are famous for the wild beauty and grandeur of their scenery. Chief among them is Glenmore, the "great glen," which extends in a straight line nearly 60 m. from Loch Eil on the W. coast to Beaully frith on the E. It contains three long lochs or lakes, whose aggregate length is 37 m.—The rivers are comprised in nine principal basins, those of the Tweed, the Forth, the Tay, the Dee and Don, the Spey, the Ness and Nairn, the Linnhe, the Clyde, and the Solway. The first six discharge their waters into the North sea, and the remaining three into the Atlantic. The principal rivers are the Tay, Clyde, Forth, Tweed, South Esk, and Dee. They are not navigable by large vessels for any considerable distance above their estuaries, with the exception of the Clyde, which has been rendered navigable to Glasgow by artificial deepening and embankment. The lakes (or lochs, as they are called in the Scottish dialect) are numerous, and are mostly in the glens of the highlands. They are generally of a length altogether disproportioned to their breadth, and the scenery around them is celebrated for grandeur and beauty. The following are some of the most noted, with the number of square miles in the area of each: Lomond, 45; Ness, 30; Awe, 30; Shin, 25; Maree, 24; Tay, 20; Archaig, 18; Shiel, 16; Lochy, 15; Laggan, 12; Morrer, 12; Fannich, 10; Eriicht, 10; Naver, 9; Earn, 9; Leven, 7; Ken, 6; and Katrine, 5. A still more characteristic feature of the country are the sea lochs, or friths or firths as they are called, deep inlets which indent the coast. The most extensive on the E. coast are the friths of Forth, Tay, Moray, and Dornoch. Between the last two is Cromarty frith, celebrated for its beauty and for its excellence as a harbor of refuge. On the N. coast is Loch Eriboll, also a good harbor, and on the W. coast the two lochs Broom, Loch Ewe, Loch Torridon, Loch Carron, Loch Alsh, Loch Sunart, and Loch Linnhe. The frith of Clyde is the largest and most useful of these inlets, of which only a few have been mentioned.—Geologically Scotland is divided into three distinct regions: 1. The southern or older palæozoic, which includes the region between the southern boundary and a line running E. N. E. from Girvan on the frith of Clyde to the Siccar point on the E. coast. It consists chiefly of lower Silurian strata, which have been forced up in various anticlinals and convolutions, and broken through in several places by felspar porphyries, trap rocks, granite, and sye-



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nite. The mountain range called the southern highlands, which crosses the island from St. Abb's Head on the North sea to Loch Ryan, is formed by these strata. These mountains seldom rise above 2,000 ft., and are clothed to the summit by grass or moss. On the English border are the Cheviots, a group consisting of feldspar porphyry and trap rocks. The principal valley of this region is that of the Tweed, which embraces some very fertile land. West of the valley of the Tweed are the vales of the Liddel, Esk, and Annan, the lower portions of which are peat bogs, the site of ancient forests, which have been in great part drained and cultivated. 2. The central or newer palæozoic region embraces the basins of the friths of Clyde, Forth, and Tay, and has an area of about 5,000 sq. m. It consists of the Devonian or old red sandstone and the carboniferous formations, with the surface extensively covered by trap rocks. The coal measures are largely productive in rich beds of bituminous coal, iron ores, and fire clay. Much of the coal is cannel, and is largely exported for gas works and domestic consumption in other countries. The boghead cannel is especially famous for producing gas and coal oil. The iron ores are worked on an immense scale, especially the variety known as the black band; and the product of the blast furnaces of this region has long been exported in large quantities to the United States, where it is known by the name of Scotch pig. South of the Forth are the Pentland hills, and north of it the Kilpatrick, Campsie, Ochil, and Sidlaw hills, a range of trap rocks. Among the remarkable isolated trap hills in this district are Arthur's Seat and the Lomond hills, and the rocks on which are built the castles of Edinburgh, Stirling, and Dumbarton. 3. The northern division, or the region of the crystalline and metamorphic rocks, comprises the whole of Scotland N. and W. of the central division, or beyond a line drawn from the frith of Clyde on the S. W. to Stonehaven on the opposite coast. This region has an area of 19,000 sq. m., and comprises the highlands. Its southern boundary is a narrow zone of clay slate, which is extensively quarried for roofing slates. North of this is an irregular band of mica slate, which begins in the peninsula called the Mull of Cantyre, and extends in a N. E. direction to the E. coast. Beyond this is an extensive formation of gneiss covering about 11,000 sq. m. This is throughout broken by granite, sometimes in small veins and in other places in huge mountain masses, forming some of the highest summits in Scotland. Among the other igneous rocks of this region, the most important is porphyry, which forms the mountains of Glencoe and the summit of Ben Nevis, the highest point of the British islands. Next on the W. coast is the red sandstone formation, with the superposed quartzite and limestone, constituting a series of lofty mountains, of which the principal peaks are about 3,000 ft.

high. The N. and E. extremity of the mainland is mostly covered by the old red sandstone or Devonian formation, which spreads N. over the Orkneys and part of Shetland. On the N. E. coast are newer secondary deposits of limited extent, the most important of which are patches of lias and oölite in Aberdeenshire, Elgin, Cromarty, and Sutherland, and greensand and chalk flints in Aberdeenshire. Lias and oölite beds are widely diffused on the W. coast and around the shores of some of the islands. In the islands of Skye, Mull, and Morven, and in Lorn on the mainland, these beds are covered by trap rock, showing that for a long period this part of Scotland was subject to volcanic action.—The climate is so tempered by the influence of the ocean that, notwithstanding the high northern latitude of the country, the thermometer rarely falls to zero, nor does it often rise above 80° in summer; the mean temperature is 47°. The prevalent winds are from the west, and the record of meteorological observations shows that during more than two thirds of the year the direction of the wind is from N. W. or S. W. In some places among the mountains the annual fall of rain is nearly 100 inches, while in other parts of the country it is only 24 inches. Observations made at 55 stations during 1872 showed the following results: highest temperature in the shade 85·3°, lowest 10°; mean day temperature 52·6°, mean night temperature 41·1°, mean temperature 46·9°; number of rainy days, 217; rainfall, 54·15 inches; mean barometer, 29·698. Easterly winds prevailed 112 days, and westerly 147 days.—The flora of Scotland does not differ materially from that of England, though there are some peculiar plants which grow only in certain restricted localities. The number of flowering plants and ferns is estimated at 1,200. Among those of a peculiarly Scottish type are the globe flower, crowberry, *trientalis Europæa*, *primula farinosa*, *haloscias Scoticum*, and *Mertensia maritima*. There are 37 species of indigenous land quadrupeds, among them the red, fallow, and roe deer, the hare, rabbit, fox, badger, otter, wild cat, weasel, and hedgehog. Bears and wolves have been exterminated, the last wolf having been killed in 1680. A few specimens of the native wild cattle are preserved in a park belonging to the duke of Hamilton. Of birds about 270 species have been noted, one half of them water birds, of which great numbers are found on the coast. The golden eagle inhabits the mountains, and the pheasant, ptarmigan, blackcock, grouse, and partridge are abundant. Reptiles are almost unknown. Fish abound in the lakes, rivers, and adjacent seas, and a great variety of shell fish occurs, among which is a mussel found in the rivers containing in some cases tolerably large pearls.—Politically, the kingdom is divided into 33 counties, grouped in eight geographical divisions. The population of these counties according to the official cen-

sus returns of 1871, and their shire towns, are given in the following table :

COUNTIES.	Pop. in 1871.	SHIRE TOWNS.
NORTHERN.		
Shetland.....	31,608	Lerwick.
Orkney.....	31,274	Kirkwall.
Caithness.....	39,992	Wick.
Sutherland.....	24,317	Dornoch.
NORTHWESTERN.		
Ross and Cromarty.....	80,955	{ Dingwall and Cromarty.
Inverness.....	87,531	Inverness.
NORTHEASTERN.		
Nairn.....	10,225	Nairn.
Elgin (or Moray).....	43,612	Elgin.
Banff.....	62,023	Banff.
Aberdeen.....	244,603	Aberdeen.
Kincardine.....	34,630	Stonehaven.
EAST MIDLAND.		
Forfar.....	237,567	Forfar.
Perth.....	127,768	Perth.
Fife.....	160,735	Cupar.
Kinross.....	7,198	Kinross.
Clackmannan.....	23,747	Clackmannan.
WEST MIDLAND.		
Stirling.....	93,218	Stirling.
Dumbarton.....	53,357	Dumbarton.
Argyle.....	75,679	Inverary.
Bute.....	16,977	Rothsay.
SOUTHWESTERN.		
Renfrew.....	216,947	Renfrew.
Ayr.....	200,809	Ayr.
Lanark.....	765,339	Lanark.
SOUTHEASTERN.		
Linlithgow.....	40,635	Linlithgow.
Edinburgh.....	323,379	Edinburgh.
Haddington.....	37,771	Haddington.
Berwick.....	36,476	Greenlaw.
Peebles.....	12,330	Peebles.
Selkirk.....	14,005	Selkirk.
SOUTHERN.		
Roxburgh.....	53,974	Jedburgh.
Dumfries.....	74,893	Dumfries.
Kirkcudbright.....	41,859	Kirkcudbright.
Wigtown.....	33,830	Wigtown.

The total area is 30,463 sq. m., of which the islands comprise about 5,000. The population has been steadily increasing for more than a century, chiefly by natural growth. In 1700 the number of inhabitants was estimated at 1,000,000; in 1755, at 1,265,000. The first government census was in 1801, and the result was 1,608,420 inhabitants. By the successive censuses at intervals of 10 years it was found that the population increased in each decade from 10 to 13 per cent. The enumeration of 1811 gave 1,805,864; of 1821, 2,091,521; of 1831, 2,364,386; of 1841, 2,620,184; of 1851, 2,888,742; of 1861, 3,062,294; and of 1871, 3,360,018, of whom 1,603,143 were males and 1,756,875 females; 161,909 lived on the islands. Scotland contains 168 cities and towns, of which 70 are royal and 79 municipal burghs. Edinburgh is the capital and the seat of the chief courts, but Glasgow is the largest city. Besides these the following, arranged in the order of their populousness, had each in 1871 more than 25,000 inhabitants: Dundee, Aberdeen, Greenock, Paisley, Leith, and Perth;

and the following more than 10,000 inhabitants: Kilmarnock, Arbroath, Kirkcaldy, Ayr, Coatbridge, Airdrie, Dumfries, Dunfermline, Montrose, Inverness, Stirling, Hamilton, Dumbarton, Hawick, Port Glasgow, and Galashiels. The kingdom in 1872 contained 887 parishes. The people are divided into two great and distinct stocks, differing in language, manners, and dress, viz.: the highlanders and the lowlanders, the former living in the mountainous north and the latter in the south. The highlanders wear a short coat, a vest, and a kilt or fillibeg, a kind of petticoat reaching scarcely to the knees, which are left entirely uncovered, the lower part of the legs being covered with short hose. These garments are usually of tartan, a kind of checkered stuff of various colors. On the head is worn a peculiar covering called a bonnet. Sometimes the plaid, a large piece of tartan, is worn around the body in the manner of the Roman toga. The language of the highlanders is the Erse or Gaelic, a Celtic dialect bearing no analogy to the English. (See CELTS, LANGUAGES AND LITERATURE OF THE.) Both the peculiar language and the peculiar costume of the highlands are gradually falling into disuse, the people adopting the manners, dress, and dialect of the lowlands. The clans or tribes into which they were formerly divided have also ceased to have any legal existence, and the hereditary chiefs who once governed them with almost absolute sway have no longer any authority. The highlanders, who at no very remote period were noted for their warlike and predatory habits, have ceased to carry arms about their persons, and are as peaceable and orderly as any other part of the British population. But they are still fond of military life, and enlist in great numbers in the British army, of which they form some of the most distinguished regiments. The peculiar language of the lowland Scots closely resembles the English, though some regard it as a dialect of the Scandinavian. It is mixed with Anglo-Saxon words and idioms, and with a few French terms which have not found their way into English. This dialect prevails not only in the lowlands, but in Caithness, Orkney, and Shetland in the north. The lowlanders, especially those of the towns, do not differ much from the English, and the two nations have been rapidly assimilating during the present century. Among the peasantry, however, many traits are preserved of a character essentially Scotch. They are marked by an athletic, bony frame, broad and high cheek bones, and a hard, weather-beaten countenance. No people have shown a more resolute determination in defence of civil and religious freedom. Their chief vices are intemperance and unchastity. In 1872, out of a total of 118,873 births in the kingdom, 10,817 or more than 9 per cent. were illegitimate; and in eight counties, Kincardine, Kinross, Aberdeen, Kirkcudbright, Wigtown, Elgin, Dumfries, and Banff, the proportion was above 12 per cent. In

Banff it was 16·4 per cent. Notwithstanding the smallness of its population, Scotland has produced an array of names eminent in literature and science which scarcely any other nation can boast of surpassing.—The agriculture of Scotland has attained to a high pitch of excellence, and in many parts of the country is conducted with a skill and energy not surpassed anywhere in the world. The climate is in many respects unfavorable to agriculture, its chief defects being the low summer temperature, the lateness of the spring, the occasional prevalence of N. E. winds and fogs, and heavy rain in the latter part of summer, which often causes great damage to the crops, and a cold, wet harvest. Still, the Lothians, the carse of Stirling, Falkirk, and Gowrie, the Mearns, Clydesdale, and Strathearn, large portions of Fifeshire, Strathmore, Annandale, Nithsdale, Kyle, Cunningham, and of the low grounds along the Moray and Cromarty friths, are so well tilled and productive that they bear comparison with the best lands in England. The whole system of cultivation in them is generally very perfect. The grain is usually sown by the drill, and much of the crop is reaped and all of it threshed by machinery. In the rich and level plains of the Lothians and Stirlingshire, where the climate is comparatively dry, the land is worth more in crop than as pasture, and the following is the common rotation: 1, oats; 2, beans or potatoes; 3, wheat; 4, turnips; 5, wheat or barley; 6, grass. In these districts guano and other light manures are liberally applied to the crops. In the higher and more moist districts a different system prevails; the land lies longer under pasture, the following being the rotation of a six years' course: 1, oats; 2, turnips; 3, oats or barley; 4, 5, and 6, grass. Rearing and feeding of cattle are carried on to a large extent in these districts, as the most profitable way of consuming the grass and green crops. In the mountains, heaths and natural grasses occupy the soil, affording a scanty herbage for sheep or cattle. Much care has been taken and great skill shown in improving the breeds of stock and in distributing them over the most eligible pasture lands. The black-faced highland sheep is kept in the wildest and stormiest mountain region of the north, as best suited to withstand the climate. The Cheviot breed is little inferior in the same respect, and has been largely introduced into the north. These animals are exposed to great hardships during snow storms, and usually receive no other food than what they find on the hills. In 1871 the total number of acres under all kinds of crops, bare fallow, and grass, was 4,516,090. The number of live stock was as follows: horses used solely for agriculture, 174,484; cattle, 1,070,107; sheep, 6,882,747; pigs, 195,642.—The mineral wealth of Scotland consists chiefly of coal and iron. In 1870 there were 411 collieries at work in the counties of Lanark, Ayr, Fife, Clackmannan, Haddington,

Edinburgh, Linlithgow, Stirling, Dumbarton, Renfrew, Dumfries, Peebles, and Perth, the aggregate product of which was 14,934,553 tons of coal. In the same year the iron works, mostly in Lanark and Ayr, produced 1,206,000 tons of pig iron. There were also in 1870 six lead mines in Argyle, Kirkcudbright, Lanark, and Dumfries, which yielded 2,390 tons of lead and 5,680 oz. of silver. Granite is largely quarried and exported from Aberdeen, Peterhead, and the coast of Mull.—The fisheries constitute a very important branch of Scottish industry. Before the export of salmon to England grew to be considerable, in some parts of the country domestic servants were accustomed to stipulate that they should not be compelled to eat it more than two or three times a week. The fishery is now chiefly in the Tweed, Forth, Tay, Dee, Don, Findhorn, Spey, Ness, and other rivers on the E. coast. The herring fishery has long been important. In 1870 the total product of this fishery was 928,613 bbls., of which 833,160 were cured. In the same year the cod and ling fisheries yielded 227,224 cwt. The herring, cod, and ling fisheries in 1870 employed 14,935 boats, of the aggregate tonnage of 103,946. The whole number of persons engaged in these fisheries was 89,790. The total value of the boats, nets, and lines employed was £953,814.—The linen manufacture was the earliest and once the most important branch of the manufacturing industry of Scotland. Its principal seats are in the counties of Fife, Forfar, and Perth. In 1870 there were 191 factories, with 330,599 spindles, and 17,419 power looms; hands employed, 49,917, of whom 13,555 were males and 36,362 females. In recent years the cotton manufacture has excelled that of linen in extent and value. It is carried on chiefly in the counties of Lanark and Renfrew, and it all centres in or is dependent upon the city of Glasgow. In 1870 there were 98 cotton factories, with 1,487,871 spindles and 25,903 power looms, employing 30,960 hands, of whom 5,148 were males and 25,812 females. The woollen manufacture, though less considerable than either the linen or the cotton, is more widely diffused, being carried on in 27 of the 33 counties, but most largely in Aberdeen, Ayr, Clackmannan, Dumfries, Lanark, Peebles, Perth, Renfrew, Roxburgh, Selkirk, and Stirling. The cloth made is chiefly coarse. In 1870 there were 218 factories, with 469,524 spindles and 10,543 power looms, employing 23,000 hands, of whom 8,515 were males and 14,485 females. In the same year there were 28 worsted factories, with 71,556 spindles and 1,201 power looms, employing 5,968 hands, of whom 2,605 were males and 3,363 females. There were also four silk factories in Paisley and Glasgow, with 12,643 spindles and 243 power looms; and 2 hemp, 48 jute, 3 hosiery, and 5 hair factories. Whiskey and ale are manufactured to a large extent. In the year ending in March, 1871, 14,501,983

gallons of spirits were distilled, and 2,435,247 bushels of malt were consumed by brewers. Edinburgh is the chief seat of the beer manufacture, and Campbeltown in Argyshire, Glenlivet, and Lochnagar of the distillery business. Other important manufactures are paper, leather, soap, earthenware, glass, hardware, hats, and combs. Ship building is carried on extensively, and large numbers of steamboats, steam engines, and other machinery are made, especially on the Clyde. The principal ship yards are at Aberdeen, Banff, Dundee, Glasgow, Greenock, and Port Glasgow. In 1872 there were built, exclusive of foreign orders, 216 vessels of 145,181 aggregate tonnage, of which 159 were of iron, 53 of wood, and 4 composite; 60 were sailing vessels of 19,414 aggregate tonnage, and 156 steamers of 125,767 tons. Besides these there were built for foreigners 39 vessels of 33,810 tons, all but two of which were steamers.—The shipping of Scotland on Dec. 31, 1872, comprised 2,568 sailing vessels of 689,768 tons burden, and 657 steam vessels of 267,337 tons. The number of sailing vessels entered coastwise in 1872 was 12,881, tonnage 987,304; steam vessels 8,658, tonnage 2,022,801. The number of sailing vessels entered from the colonies in 1872 was 546 (49 foreign), tonnage 369,187; cleared, 623, tonnage 380,113. In the same year 48 steamers, of 45,139 tons, entered from the colonies; cleared 116, of 101,976 tons. The number of sailing vessels entered from foreign ports in 1872 was 6,402 (1,685 British), of 1,071,762 tons; cleared for foreign ports, 6,721 (1,366 British), of 678,687 tons. The number of steamers entered from foreign ports the same year was 1,368 (183 foreign), tonnage 684,383; cleared for foreign ports, 1,509 (206 foreign), tonnage 744,139.—Scotland is well supplied with roads, canals, and railways. Her turnpike roads, of which more than 7,000 m. are open, are among the best in the world. The greatest of her canals is the Caledonian, which affords a passage for ships from the North sea to the Atlantic ocean. (See CANAL.) Another canal connects the opposite coasts of the island, and extends from Glasgow to Edinburgh in two divisions: the Forth and Clyde canal, finished in 1790, 38 m. long; and the Union canal, finished in 1822, 31 m. long. Paisley canal, from Glasgow through Paisley to Johnstone, is 11 m. long; Monkland canal, between Glasgow and Airdrie, 12 m.; Glenkens canal, from the mouth of the Dee through Loch Ken to Dalry, 26 m. The first railway in Scotland was opened in 1810 between Kilmarnock and Troon, 10 m. On Dec. 31, 1873, 2,612 m. of railway were in operation. The aggregate authorized capital of all the companies was £76,461,819. During 1873 the passage receipts amounted to £1,963,979; freight receipts, £4,343,809; total, £6,307,788. The total working expenditure for the same year was £2,943,518. Most of the smaller railway

lines are leased or worked by the great trunk lines, of which there are five: the Caledonian, which monopolizes half the trade of Scotland, particularly on the E. side, and controls 11 branch roads; the Glasgow and Southwestern, between Carlisle and Glasgow, with several branches; the Great North of Scotland, from Aberdeen to Torres, where it connects with the Highland, and which works four other roads; the Highland, from Perth to Inverness and Golspie, which is extending its line further north, and which works three other roads; and the North British, from Carlisle to Edinburgh *via* Hawick, which works six other lines and has many branches. The principal ports are connected by lines of steamers with each other and with many ports of the world.—In general government Scotland forms an integral part of the United Kingdom, and stands on the same footing with England except in regard to law and law courts and the form of church government, upon which points express stipulations exist in the articles of union between the two kingdoms. To the imperial parliament the Scottish nobles elect of their own number 16 peers to represent them in the house of lords. In 1874 Scotland was represented in the house of commons by 60 members, of whom 32 were elected by the counties, 26 by the parliamentary burghs, and 2 by the four universities. The number of electors on the register in the same year was 280,308, of whom 82,807 were county voters, and 187,991 borough electors. At the head of the judiciary in Scotland is the court of session, which is supreme in civil matters, and consists of 13 judges. The court holds two terms annually, during which it sits five days in the week. The court of justiciary, which is supreme in criminal causes, consists of five of the judges of the court of session. The high court of justiciary sits in Edinburgh, but circuit courts are held to the number of four in Glasgow and two in the other circuit districts annually. This court has jurisdiction in all important criminal charges, and the decisions of its high court are without appeal. Its presiding officer is the president of the court of session, who when sitting in this court is termed the lord justice general. Causes are tried by the verdict of a jury of 15 persons, who are not required to be unanimous, and who, when the case is not clear, can bring in a verdict of "not proven," which leaves the accused liable to be tried again for the same offence should additional evidence be found. The judges of this court when upon circuit possess a civil jurisdiction by way of appeal. The chief local courts are those of the sheriffs, of which there is one in each county, the business of the court being conducted before an officer called the sheriff substitute, acting for a sheriff principal, who has within certain limits a power to revise his proceedings, while there are certain acts both judicial and executive which must be performed by the sheriff

principal. The counties have been grouped into districts, and one sheriff principal serves for all the counties in a district. The sheriff's court has no jurisdiction in questions of land rights nor of personal *status*, as marriage or legitimacy, but in other matters of civil right there is no limit in pecuniary value to the causes that may come before it. The proceedings in the civil department of this court are chiefly conducted in written pleadings. The sheriff has a separate court for the recovery of small debts, in which the procedure is oral and summary. The magistrates of municipal corporations and justices of the peace appointed by the king have jurisdiction both in civil and criminal matters in a limited sphere. In many particulars the law of Scotland differs from that of England, and bears much affinity in theory and practice to the systems of the continent, especially to the old systems of judicature in France, on which it was modelled.—The public revenue of Scotland for the year ending March 31, 1874, was £7,138,543, and was derived from customs, excise, stamps, land and assessed taxes, property and income tax, and the post office. The assessed taxes comprise duties on inhabited houses, servants, carriages, horses, dogs, game, &c., for the support and relief of the poor. In 1872, out of a total of 117,611 poor persons, 74,752 were classed as paupers and 42,859 as dependants. The whole amount received from poor rates was £888,002, of which £862,171 was expended in relief. In the same year 3,042 criminals, of whom 2,354 were males and 688 females, were committed for trial. Of these 2,259 were convicted, and 744 acquitted.—The established church of Scotland is the Presbyterian, from which there are several seceding bodies, the most important of which are the Free church and the United Presbyterian church. In 1874 the established church had 16 synods, 84 presbyteries, 1,280 congregations, and about 1,300 ministers; the Free church, 16 synods, 77 presbyteries, 954 congregations, and 957 ministers; and the United Presbyterian, 31 presbyteries and 611 congregations (including those in England). The Independents had 119 ministers; Episcopalians, 6 bishops and about 220 clergy; and Roman Catholics, 3 vicars apostolic and 228 clergy. In 1695 it was enacted "that there be a school founded and a schoolmaster appointed in every parish by advice of the presbyteries; and to this purpose that the heritors do in every congregation meet among themselves and provide a commodious house for a school, and modify a stipend to the schoolmaster, which shall not be under 100 merks (£5 11s. 1½d.), nor above 200 merks (£11 2s. 2½d.), to be paid yearly at two terms." This was the foundation of a system of common schools, under which the Scottish people in the 18th century became more generally educated than any other in Europe. In 1803 the salary of the schoolmaster was raised so that it should not be less than

£16 13s. 4d. per annum. In 1828 it was again raised so that it should not be less than £25 13s. 3½d. A further increase was made in 1859, dependent somewhat on the price of oatmeal. In addition to the salary fixed by law, the teachers receive fees commonly averaging for each pupil not more than 5s. a year. Besides the parish schools there are many schools maintained by the "Society in Scotland for Propagating Christian Knowledge," and by the established church and other denominations. There are also a large number of private schools. In the cities and larger towns there are grammar or high schools and academies, and there are several normal schools for the training of teachers. In 1873 the number of primary schools inspected by the government inspectors was 2,108, of which 1,379 belonged to the established church, 577 to the Free church, 86 to the Episcopal church, and 66 to the Catholic church. The average number of children in attendance was 225,178, number of certificated teachers 2,657, and number of pupil and assistant teachers 3,623. The income of these schools from government grants was £100,370, from endowments £28,853, from voluntary contributions £66,921, from school pence £115,706, and from other sources £802; total income, £312,652. The total number of schools under inspection was 2,507, with 241,798 pupils present at annual inspection. The whole number of children in Scotland from 5 to 13 years of age in 1871 was 629,235, of whom 494,860 were receiving education. The number of reformatory schools was 12, with 791 boys and 257 girls; the number of industrial schools 27, with 2,493 boys and 992 girls. The higher seats of education in Scotland are the universities of Edinburgh, Glasgow, Aberdeen, and St. Andrews, for accounts of which see the articles on those cities. The periodical press of Scotland has long been distinguished for its vigor and ability. The "Edinburgh Review," "Blackwood's Edinburgh Magazine," the "North British Review," and "Chambers's Journal" stand in the front rank of that species of literature; and the first two especially attained in the first half of this century a reputation that has no superior of its kind. As a place of publication Edinburgh is the only rival of London in the British empire, and has long been celebrated for its issues of books.—Scotland was known to the Romans by the name of Caledonia, and was inhabited by 21 savage tribes of shepherds and hunters of Celtic race, who were polygamists and idolaters, their religion being druidical, and their habits so disorderly that the Roman writers call them robbers. They were exceedingly brave and hardy, and their arms were short spears, daggers, and shields. Their habitations were miserable huts, and they disdained the use of clothes. To their Roman invaders they offered a fierce and obstinate opposition. In the reign of Titus (A. D. 79–81) Julius Agricola led a Roman army beyond the friths of Forth and Clyde, pene-

trated to the frith of Tay, and in 84 defeated the Caledonians under Galgacus, while his fleet explored the coasts, and first made certain that Britain was an island. He was unable to complete the conquest of the country, and finally withdrew his forces behind a wall and chain of forts with which he had connected the friths of Forth and Clyde. Several other attempts were made by the Romans to subdue the north of the island, the most memorable of which was that of the emperor Septimius Severus, who in 209 led an expedition as far as Moray frith, where he made a peace with the Caledonians. But on his withdrawal to the south they rose in insurrection, and a second expedition was preparing to march for their subjugation when the emperor died at York (Eboracum) in 211. During his residence in Britain Severus reconstructed a wall originally built by Hadrian between the Tyne and the Solway; and shortly before the final abandonment of Britain by the Romans in the early part of the 5th century, they repaired this rampart and that between the friths of Clyde and Forth. From this period for several centuries the predominant race of Scotland is known in history as Picts. (See PICTS.) Between the two walls in the province of Valentia (Northumberland, Dumfriesshire, &c.) dwelt five tribes who had become practically Romanized and civilized, and after the withdrawal of the Romans formed a union and established a kingdom which was called *Regnum Cumbrense*, and is also known as the kingdom of Strathclyde. Of this kingdom at the beginning of the 6th century the famous Arthur Pendragon was the sovereign. In this half fabulous period of Scottish history 38 Pictish kings are enumerated, from Drest, who succeeded to the throne in 451, to Brud, who died in 843. The most important event of this period was the arrival in Scotland of the Saxons in 449, and their eventual conquest and settlement of the lowlands, where one of their leaders, Edwin, founded the present capital, Edinburgh (Edwinsburgh). About 503 Scotland was also invaded by the Scots, a Celtic tribe from Ireland, who settled on the W. coast and established a kingdom beginning with the reign of Fergus, one of their chiefs, and continuing under a series of kings, of whom little is known till the accession of Kenneth Macalpin in 836, under whom the Scoto-Irish or Scotch became the dominant race in the country, which now began to be called Scotland. During the reign of Kenneth the Picts disappeared as a people, being according to some authors massacred by the orders of Kenneth, but according to a more probable theory amalgamated with and absorbed by the Scots. The most important event of the Pictish period was the conversion of the natives to Christianity in the 6th century by St. Columba and other missionaries from Ireland. In 866, under the reign of Constantine I., the second of the successors of Kenneth, the Danes, led by

the vikings, began to invade Scotland. Their incursions for plunder and conquest continued with little intermission, in spite of frequent repulses, till 1014, when, after a series of defeats by King Malcolm II., they gave up the contest. Meantime the Scottish kingdom was gradually enlarged by the peaceful annexation of Cumberland about 950, by the conquest of Strathclyde about 970, and of Lothian from England in 1018. This last acquisition was owing to the valor and energy of Malcolm II., who after a vigorous reign was succeeded in 1033 by his grandson, the "gracious Duncan" of Shakespeare, who six years later was killed by Macbeth at Bothgowanan, near Elgin. Macbeth himself was defeated and slain in 1056 or 1057, after a vigorous reign, and was succeeded by Malcolm III. in 1057. During his reign England was conquered by the Normans, and Malcolm, who had married the Saxon princess Margaret, sister of Edgar Atheling, the heir of the Saxon line, invaded and ravaged the north of England. In retaliation William the Conqueror invaded Scotland in 1072 with so powerful a force that Malcolm submitted without a struggle, and performed homage to William as his feudal superior for, as the English subsequently alleged, his whole kingdom, though the Scotch maintained that the homage was rendered only for the 12 manors which Malcolm held in England. The question was long a source of dissension between the two kingdoms, and led to a war between Malcolm and William Rufus, in which, in 1093, the Scottish king was slain in a battle near Alnwick castle. Of his successors the most conspicuous were Alexander I., David I., Malcolm IV., William the Lion, Alexander II., and Alexander III., in whose reign, terminating in 1286, Scotland made rapid progress in power and civilization. The reign of William the Lion, which lasted 48 years, from 1165 to 1214, was memorable for his capture by Henry II. of England, and his disgraceful treaty with that monarch in 1174, by which he regained his liberty and surrendered the independence of Scotland, agreeing to become the vassal of Henry and to receive English garrisons in Edinburgh, Stirling, and other important places. This state of dependence continued till the death of Henry in 1189, when his successor, Richard Cœur de Lion, anxious to obtain money for his crusade to the Holy Land, agreed for the sum of 10,000 marks to renounce all claim on the part of the English crown to supremacy over Scotland. William the Lion was succeeded by his son Alexander II., one of the wisest and most vigorous of the Scottish monarchs, whose son Alexander III., dying in 1286, left the crown to an infant granddaughter, Margaret, daughter of Eric, king of Norway. On her voyage from Norway to take possession of the throne, Margaret died in one of the Orkneys. Various competitors for the crown appeared, the principal of whom were John Balliol and Robert Bruce. Edward I. of England offered or was

invited to mediate between them, for which purpose a conference was held at Norham in 1291 between the English monarch and the principal nobility and clergy of Scotland. Edward awarded the crown to Balliol, on condition that he should do homage to him as his feudal superior. He swore allegiance, but when called upon soon after to aid Edward against France, he renounced his allegiance and declared war, upon which Scotland was overrun by a powerful English army, Balliol taken prisoner and sent to the tower of London, and the principal strongholds of the kingdom captured. At this juncture, when nearly all the great nobles had submitted to the conqueror, Sir William Wallace of Ellerslie appeared in arms at the head of a small band of followers, and continued the contest with heroic energy for several years, until he was at length betrayed into the hands of Edward, who caused him to be cruelly executed at London (1305). The struggle was continued by Robert Bruce, grandson of the competitor of Balliol, at first with marked ill fortune, but finally culminating in the great battle of Bannockburn, June 24, 1314, where the English under Edward II. were utterly routed and dispersed by a much inferior force of Scots. The war continued 14 years longer, during which England was 12 times invaded and scourged with fire and sword, until, by a treaty ratified in 1328, Edward III. renounced his claim of sovereignty. Bruce died in 1329. During the century which succeeded the sceptre was swayed by three kings, one of whom, Robert II. (1371-90), was the son of the steward of Scotland, whence the origin of the name of the royal house of Stuart, of which he was the first sovereign. His successor, Robert III. (1390-1406), devolved the cares of government upon his eldest son, the duke of Rothesay, who quarrelled with his uncle, the duke of Albany, and was starved to death by order of that powerful magnate. The king's second son, James, on his voyage to France in 1405, was captured by the English and carried a prisoner to England, where he was detained for 19 years, during the greater part of which the government of Scotland was administered by Albany as regent. In 1424 the captive prince was released, and returning to Scotland began a brief reign of great energy, devoted mainly to reducing to order the powerful and turbulent nobility. He made many great reforms, instituted the court of session and other tribunals, and introduced law and order in the place of license and turbulence. He was assassinated in 1437, and was succeeded by his son James II., a boy of six years, during whose minority the kingdom was torn by factions, one of which was headed by the earl of Douglas, whose immense possessions made him the most powerful baron of Scotland. The king on attaining his majority assumed the reins of government with vigor and decision, and effectually humbled the house of Douglas, whose

chief he stabbed with his own hand in the castle of Stirling in 1452. The king subsequently took part in the civil wars of England on the side of Henry VI., and was accidentally killed while besieging Roxburgh in 1460. His son James III. was then in his eighth year, and during his minority the country, in spite of the turbulence of the nobles, was comparatively prosperous, while after his accession civil war raged almost constantly between the king and his brother the duke of Albany, who assumed the title of Alexander, king of Scotland, and was supported by the Douglasses, by the lord of the Isles, and many other great nobles. Albany was finally defeated in 1483; but a new rebellion broke out a few years later, the chiefs of which arrayed the king's son, a youth of 16, against his father, and the latter was defeated and slain at Sauchie-burn in 1488. The rebellious son, who succeeded under the title of James IV., maintained a magnificent court, promoted the civilization of the country, and curbed the power of the nobles and of the great highland chiefs, the most considerable of whom, the lord of the Isles, having rebelled, was promptly subdued and stripped of his extensive dominions, which were forfeited to the crown. In 1513 he was imprudently led by French influence, which had long been very great in Scotland, to declare war against Henry VIII. of England, and to invade that kingdom with a powerful army. He was met by the earl of Surrey at Flodden, Sept. 9, and defeated and slain, together with so many chiefs, nobles, and common soldiers, that all Scotland was plunged in mourning; and to this day the defeat is regarded by the Scotch as the greatest disaster in their national annals. A long series of misfortunes followed during the minority of James V., the son of James IV., whose mother, Margaret Tudor, daughter of Henry VII. of England, was made regent, and speedily became involved in quarrels with the nobles. She had rashly married the earl of Angus, the head of the house of Douglas, and that faction retained possession of the young king's person till in his 17th year he freed himself from their yoke and assumed the reins of government, and, after a struggle in which the Douglasses were supported by England, succeeded in driving them into exile. During his reign Protestantism made great progress in Scotland, though severely persecuted by Cardinal Beaton, the Catholic primate. In 1542 James became involved in war with England, and died in the same year of a broken heart caused by the mutinous conduct of the nobles, which had led to a disgraceful defeat of his army at Solway Moss. The crown descended to his only child, a daughter a few days old, the celebrated and unfortunate Mary queen of Scots. (For the history of Scotland during her reign, see MARY STUART.) Mary was driven into exile in England in 1568, and her absence left her natural brother, the regent Murray, mas-

ter of the kingdom. Her son James VI. had been crowned king in 1567, while yet an infant. During his minority, after Murray's assassination in 1570, the earls of Lennox, Mar, and Morton were successively regents, till in 1581 Morton was tried and executed for treason, and the king took the government into his own hands. During all this period the kingdom was distracted by civil war, which had gradually assumed a religious character from the contest between Catholicism and Protestantism for supremacy, in which the Protestants were finally successful, and Presbyterianism became the established religion of Scotland. James, by his descent from Margaret Tudor, the mother of James V., was the heir to the English crown on the death of Queen Elizabeth, and accordingly in 1603 he succeeded to the throne of England. This event, which united the two nations under one head, closed the history of Scotland as a separate kingdom, though it was not till 1707 that the countries were legislatively united. During the great civil wars of England in the 17th century Scotland was the scene of many important events, to which reference has been made in the article ENGLAND. Since the union the most remarkable occurrences in her annals are the two rebellions of 1715 and 1745, the object of which was the restoration of the exiled Stuarts to the throne.—See "History of Scotland during the Reigns of Mary and James VI.," by William Robertson (2 vols. 4to, 1759); P. F. Tytler's "History of Scotland" (9 vols., 1828-'43); and "History of Scotland from Agricola's Invasion to the Revolution of 1688," by John Hill Burton (7 vols., Edinburgh and London, 1867-'70).

SCOTLAND, Church of. See PRESBYTERIANISM.

SCOTT, the name of 11 counties in the United States. **I.** A S. W. county of Virginia, bounded S. by Tennessee and intersected by Clinch river and the N. fork of Holston river; area, about 450 sq. m.; pop. in 1870, 13,036, of whom 524 were colored. The Clinch mountain and several parallel ridges traverse it. The soil is generally good, and adapted to grazing. Bituminous coal and iron abound. The "Natural Tunnel," perforated through a lofty ridge by a branch of the Clinch river, is in this county. The chief productions in 1870 were 53,583 bushels of wheat, 222,254 of Indian corn, 68,730 of oats, 16,557 lbs. of tobacco, 24,249 of wool, 95,354 of butter, 6,645 of flax, 31,818 of maple sugar, 22,539 of honey, and 13,980 gallons of sorghum molasses. There were 2,528 horses, 2,991 milch cows, 4,430 other cattle, 13,415 sheep, and 10,076 swine. Capital, Es-tillville. **II.** A central county of Mississippi, drained by several tributaries of Pearl river; area, about 600 sq. m.; pop. in 1870, 7,847, of whom 3,167 were colored. There are large forests of pine, and the soil is sandy and sterile. It is intersected by the Vicksburg and Meridian railroad. The chief productions in 1870 were 131,775 bushels of Indian corn, 9,450 of oats,

and 3,560 bales of cotton. There were 988 horses, 567 mules and asses, 2,343 milch cows, 956 working oxen, 3,296 other cattle, 2,399 sheep, and 11,429 swine. Capital, Hillsboro.

III. A W. county of Arkansas, drained by the Fourche la Pave, Petit Jean, and other tributaries of the Arkansas river; area, about 800 sq. m.; pop. in 1870, 7,483, of whom 121 were colored. The surface is uneven and the soil generally fertile. The chief productions in 1870 were 13,141 bushels of wheat, 304,408 of Indian corn, 9,940 of oats, 30,411 lbs. of tobacco, 3,128 of wool, 71,530 of butter, and 678 bales of cotton. There are 2,514 horses, 296 mules and asses, 3,057 milch cows, 1,218 working oxen, 4,374 other cattle, 2,268 sheep, and 21,753 swine. Capital, Waldron. **IV.** A N. E. county of Tennessee, bordering on Kentucky, and drained by the Big South fork of the Cumberland river; area, 300 sq. m.; pop. in 1870, 4,054. It is traversed by the Cumberland mountains, and has an abundance of timber and coal. The chief productions in 1870 were 88,311 bushels of Indian corn, 17,793 of oats, 9,283 lbs. of tobacco, 12,560 of wool, 71,810 of butter, and 22,268 of honey. There were 824 horses, 1,400 milch cows, 2,537 other cattle, 6,589 sheep, and 13,189 swine. Capital, Huntsville. **V.** A N. county of Kentucky, drained by tributaries of the Kentucky river; area, 240 sq. m.; pop. in 1870, 11,607, of whom 3,955 were colored. The surface is generally hilly and the soil extremely fertile. Fine blue limestone is found in great abundance. The Louisville, Cincinnati, and Lexington railroad crosses the S. portion. The chief productions in 1870 were 47,770 bushels of wheat, 26,774 of rye, 573,620 of Indian corn, 76,156 of oats, 32,900 lbs. of tobacco, 31,329 of wool, 70,499 of butter, and 10,338 gallons of sorghum molasses. There were 3,728 horses, 1,413 mules and asses, 2,242 milch cows, 5,171 other cattle, 7,743 sheep, and 16,397 swine. Capital, Georgetown. **VI.** A S. E. county of Indiana, drained by affluents of White river; area, about 200 sq. m.; pop. in 1870, 7,873. The surface is flat, except in the west, where are some high hills called the Knobs. The soil is good. The Ohio and Mississippi and the Jeffersonville, Madison, and Indianapolis railroads traverse it. The chief productions in 1870 were 41,756 bushels of wheat, 213,475 of Indian corn, 69,235 of oats, 5,729 tons of hay, 16,700 lbs. of tobacco, 28,007 of wool, 131,080 of butter, and 30,814 gallons of sorghum molasses. There were 2,342 horses, 1,509 milch cows, 2,309 other cattle, 9,652 sheep, and 8,815 swine; 5 manufactories of carriages and wagons, and 11 saw mills. Capital, Lexington. **VII.** A W. county of Illinois, bounded W. by Illinois river and intersected by Plume and other creeks; area, 255 sq. m.; pop. in 1870, 10,530. The surface is mostly level and well timbered, and the soil very fertile. Coal and limestone abound. It is traversed by the Rockford, Rock Island, and Pacific, and the Toledo, Wabash, and West-

ern railroads. The chief productions in 1870 were 266,123 bushels of wheat, 752,771 of Indian corn, 13,462 of oats, 12,457 of potatoes, 4,735 tons of hay, 21,174 lbs. of wool, and 45,570 of butter. There were 3,257 horses, 2,151 milch cows, 5,958 other cattle, 6,077 sheep, and 17,285 swine; 5 manufactories of carriages and wagons, 5 of stone and earthen ware, and 4 saw mills. Capital, Winchester.

VIII. A S. E. county of Minnesota, bounded N. W. by the Minnesota river; area, about 420 sq. m.; pop. in 1870, 11,042. The surface is undulating, with a variety of prairie land and large forests, and the soil is fertile. Timber is a valuable product. The St. Paul and Sioux City and the Hastings and Dakota railroads traverse it. The chief productions in 1870 were 362,406 bushels of wheat, 186,012 of Indian corn, 165,247 of oats, 19,700 tons of hay, 13,446 lbs. of wool, 319,142 of butter, and 8,750 of hops. There were 2,042 horses, 4,262 milch cows, 6,993 other cattle, 3,863 sheep, and 6,654 swine; 3 manufactories of carriages and wagons, 3 of lime, 1 railroad repair shop, 4 breweries, and 5 saw mills. Capital, Shakopee.

IX. An E. county of Iowa, bounded E. and S. by the Mississippi, which separates it from Illinois, and N. by the Wapsipinicon; area, 450 sq. m.; pop. in 1870, 38,599. It has an elevated, rolling surface, thinly timbered, and a fertile soil. Coal and limestone are found. It is traversed by the Davenport and St. Paul railroad, and the Iowa division of the Chicago, Rock Island, and Pacific. The chief productions in 1870 were 620,954 bushels of wheat, 1,855,226 of Indian corn, 538,102 of oats, 638,440 of barley, 361,647 of potatoes, 34,376 tons of hay, 13,635 lbs. of wool, 702,706 of butter, 55,640 of cheese, and 11,726 of honey. There were 9,386 horses, 9,846 milch cows, 11,771 other cattle, 3,721 sheep, and 32,757 swine; 5 manufactories of agricultural implements, 1 of boats, 5 of brick, 26 of carriages and wagons, 19 of men's clothing, 4 of cooperage, 13 of furniture, 3 of iron castings, 3 of lime, 13 of saddlery and harness, 16 of cigars, 1 of woollen goods, 8 flour mills, 7 saw mills, and 9 breweries. Capital, Davenport.

X. A S. E. county of Missouri, separated from Illinois by the Mississippi river; area, about 440 sq. m.; pop. in 1870, 7,217, of whom 326 were colored. The surface is uneven, and the soil generally fertile. There are vast cypress swamps in the S. part. It is traversed by the St. Louis and Columbus division of the St. Louis and Iron Mountain railroad, and the Cairo, Arkansas, and Texas railroad. The chief productions in 1870 were 77,020 bushels of wheat, 428,857 of Indian corn, 19,291 of oats, 22,659 of potatoes, 6,440 lbs. of tobacco, 4,932 of wool, and 6,531 gallons of sorghum molasses. There were 1,780 horses, 764 mules and asses, 1,777 milch cows, 2,687 other cattle, 3,225 sheep, and 17,343 swine; 1 flour mill, and 6 saw mills. Capital, Benton. **XI.** An unorganized W. county of Kansas, watered by

affluents of Smoky Hill river and of Walnut creek, a tributary of the Arkansas; area, 720 sq. m. The surface is rolling and the soil fertile.

SCOTT, David, a Scottish artist, born in Edinburgh, Oct. 10 or 12, 1806, died there, March 5, 1849. He was an engraver and painter, and engraved after Stothard a series of illustrations for Thomson's "Scottish Melodies." He painted in 1828 "The Hopes of Early Genius dispelled by Death," and in 1830 sent to the British institution his "Lot and his Daughters fleeing from Sodom," which was rejected. In 1831 he exhibited the "Monograms of Man," a series of outline etchings, and the first of 25 illustrations of Coleridge's "Ancient Mariner." In 1832 he painted "Sarpidon carried by Sleep and Death," and "Discord, or the Household Gods destroyed," and subsequently "Ariel and Caliban," "The Alchymist," "Silenus praising Wine," and his masterpiece, "Vasco da Gama encountering the Spirit of the Cape." He also illustrated the "Pilgrim's Progress," and contributed to "Blackwood's Magazine" a series of essays on the "Characteristics of the Great Masters" (1840). His journal in Italy, with poems, notes on art, and other papers, have been published with a memoir by his brother, W. B. Scott (8vo, London, 1850).

SCOTT, Julian. See supplement.

SCOTT, Michael, a reputed Scotch wizard of the 13th century, born probably in Fifeshire, died, it is supposed, in 1291. He was probably educated at some foreign university, and resided for some time at the court of the emperor Frederick II., at whose request he wrote a number of works. A few treatises on natural history, the occult sciences, and other subjects are attributed to him. His reputation was European; traditions of his wonderful powers are still extant in Scotland. Dante introduces him in the *Inferno*, and he is mentioned by Boccaccio and other Italian authors. Camden says in his *Britannia* that in his time Scott's magic books were still preserved at Ulme, in Cumberland, and adds that he was a monk of that place about the year 1290, who from his reputation for abstruse learning was commonly looked upon as a conjurer.

SCOTT, Thomas, an English clergyman, born at Braytoft, Lincolnshire, Feb. 16, 1747, died at Aston Sandford, Buckinghamshire, April 16, 1821. He was ordained in 1773, became a curate in Buckinghamshire, and through the influence of John Newton was converted to Calvinism. In 1781 he removed to Olney, and in 1785 to London, where he was chaplain of Lock hospital. In 1801 he was appointed rector of Aston Sandford. He published "A Commentary on the Bible" (6 vols. 4to); "Defence of Calvinism" against Bishop Tomline; and a small work entitled "The Force of Truth," many times reprinted.

SCOTT, Sir Walter, a Scottish author, born in Edinburgh, Aug. 15, 1771, died at Abbotsford, Sept. 21, 1832. He was a younger son of

Walter Scott, a writer to the signet, allied to the Scotts of Harden, an offshoot from the house of Buccleuch. His mother was Anne, daughter of John Rutherford, a medical professor in the university of Edinburgh. Being delicate, he was sent at three years of age to reside on his paternal grandfather's farm of Sandyknowe, in Roxburghshire. In 1779 he returned to Edinburgh greatly improved in health, with the exception of a lameness which appeared in his second year and never left him. Soon after he entered the high school of Edinburgh, whence, in October, 1783, he was transferred to the university. He was apprenticed in May, 1786, to legal business in the office of his father, and was called to the Scottish bar in July, 1792. His earliest publications were metrical versions of Bürger's "*Leonora*" and "*Wild Huntsman*" (4to, 1796). Subsequently he composed the ballads "*Glenfinlas*," "*The Eve of St. John*," and "*The Grey Brother*," published in 1799 in Lewis's "*Tales of Wonder*." About the same time he produced a translation of Goethe's *Götz von Berlichingen*. He had meanwhile (December, 1797) married Charlotte Margaret Carpenter, a young lady of French extraction, and was in the enjoyment of a comfortable income. In 1799 he was appointed sheriff depute of Selkirkshire. In 1802 appeared the first two volumes of his "*Minstrelsy of the Scottish Border*," a collection of ancient ballads, in 1803 the third volume, and in 1804 his annotated edition of the ancient poem of "*Sir Tristrem*." These works were preliminary to "*The Lay of the Last Minstrel*," of which the first draught had been written in the autumn of 1802, and which on its appearance in 1805 met with an enthusiastic reception. Scott's appointment in 1806 to one of the principal clerkships in the Scottish court of session, with a salary of £800 (subsequently increased to £1,300), enabled him to devote himself entirely to literature. He produced a collection of "*Ballads and Lyrical Pieces*" (1806), and edited a complete edition of the works of Dryden, with a life of the poet (1808). In 1808 appeared "*Marmion, a Tale of Flodden Field*," followed in 1810 by "*The Lady of the Lake*." His succeeding poems, "*The Vision of Don Roderick*" (1811), "*Rokeby*" (1812), a tale of the English civil wars, "*The Bridal of Triermain*" (anonymous, 1813), "*The Lord of the Isles*" (1814), "*The Field of Waterloo*" (1815), and "*Harold the Dauntless*" (1817), are far inferior, though having occasional passages of great beauty. In the summer of 1814 some mislaid sheets of a novel designed to illustrate highland scenery and customs in the era of 1745, which had been commenced in 1805, but laid aside, fell in his way. The second and third volumes were written in three weeks, and in July of the same year the work was published anonymously under the title of "*Waverley, or 'tis Sixty Years Since*." The publication marked an era in the history of English fiction. He had been

in the habit of passing his summers at Ashiestiel on the Tweed, near Selkirk, an estate belonging to a kinsman, and in 1811 he purchased a small farm on that river, within a few miles of Melrose, to which he gave the name of Abbotsford, and which by successive purchases, often made at exorbitant prices, gradually expanded into a large domain. The modest dwelling first erected upon it grew in the course of a few years into a large Gothic castellated mansion; and it was the owner's chief occupation, in the intervals of literary labor or of hospitable duties, to add to the embellishments of both house and grounds. He now produced his novels in rapid succession; and perhaps one reason for maintaining his incognito was his unwillingness to impair his standing as a landed proprietor by allowing it to be known that he was an author writing for fortune. To "*Waverley*" succeeded in 1815 "*Guy Mannering*," and in 1816 "*The Antiquary*," both "by the author of *Waverley*." His next tales, "*The Black Dwarf*" and "*Old Mortality*" (1816), constituted the first series of the "*Tales of my Landlord*," while "*Rob Roy*" (1817) was "by the author of *Waverley*." In 1818 appeared "*The Heart of Mid-Lothian*," and in 1819 "*The Bride of Lammermoor*" and "*A Legend of Montrose*," forming additional series of "*Tales of my Landlord*." "*Ivanhoe*" (1819), which was to have appeared under a new incognito, was, in consequence of the publication of a novel in London pretending to be a fourth series of "*Tales of my Landlord*," announced as "by the author of *Waverley*." "*The Monastery*" and "*The Abbot*" appeared in 1820, "*Kenilworth*" and "*The Pirate*" in 1821, "*The Fortunes of Nigel*" in 1822, "*Peveril of the Peak*," "*Quentin Durward*," and "*St. Ronan's Well*" in 1823, "*Redgauntlet*" in 1824, and "*Tales of the Crusaders*," comprising "*The Betrothed*" and "*The Talisman*," in 1825, all "by the author of *Waverley*." Down to the end of 1825 he was engaged in a variety of miscellaneous enterprises besides those specified. In 1809 he edited the "*State Papers and Letters of Sir Ralph Sadler*," in 1809-'12 "*Lord Somers's Collection of Tracts*" (13 vols. 4to), and in 1814 the works of Swift in 19 volumes, with a life of the author. An excursion to the continent after the battle of Waterloo furnished the materials for "*Paul's Letters to his Kinsfolk*." He was also an occasional contributor to the "*Edinburgh*" and "*Quarterly*" reviews and other periodicals, including the "*Edinburgh Annual Register*," the historical department of which he conducted in 1814-'15. To these must be added his dramatic sketches, "*Halidon Hill*" (1822) and "*Macduff's Cross*," and the articles on "*Chivalry*," "*Romance*," and the "*Drama*," for the "*Encyclopædia Britannica*." With the increase of his prosperity he kept state at Abbotsford like a wealthy country gentleman, and from March to December it was the resort of in-

numerable visitors of every rank and degree. His mornings until 11 o'clock were devoted to composition, and the rest of the day to the superintendence of the works of improvement on his grounds, or the entertainment of his guests and family. In spite of his lameness he was an indefatigable walker and rider. His winters were passed at his house in Edinburgh. His literary fame, greatly enhanced by the steadily growing belief that he was identical with the author of "Waverley," seems never to have disturbed his equanimity; and the baronetcy conferred upon him by George IV. in 1820 was probably received with more satisfaction than the praises of the public. In January, 1826, Constable and co. of Edinburgh, his publishers, were obliged, in consequence of a commercial crisis, to suspend payment, and Scott was found to have incurred liabilities to their creditors to the amount of £72,000. In his eagerness to enlarge and embellish Abbotsford, and to maintain his style of living, he had been in the habit of receiving from Constable and co. large sums in anticipation of works in progress or which he proposed to write, and was thus led, on the principle of mutual accommodation, to give the firm counter acceptances or to indorse their bills. This disaster was almost immediately followed by the failure of the printing house of James Ballantyne and co., which had printed Scott's works since 1802, and of which, it was now discovered, he had been a secret partner since 1805. The affairs of the two firms had become badly involved with each other; and Scott was found to be liable, as partner of Ballantyne and co., for the total amount of the debts of the firm, which somewhat exceeded £100,000. As about half of the £72,000 due to the creditors of Constable and co. was included in the debts of Ballantyne and co., his actual liabilities on account of both firms amounted to a little less than £150,000. He refused the composition which his creditors offered him, and, having procured an extension of time, at the age of 55 set about the task of reimbursing them by his literary labors. He surrendered his town house and most of his available assets, but still clung to Abbotsford, although obliged to live there in humbler style. In 1826 appeared "Woodstock," a novel written during the crisis of his financial troubles, and in 1827 "Chronicles of the Canongate, First Series," and the "Life of Napoleon Bonaparte," the latter of which produced for his creditors £18,000. At a dinner given for the benefit of the Edinburgh theatrical fund on Feb. 23, 1827, he finally threw off the mantle of disguise, which he observed to a friend had become somewhat tattered, and declared himself to be the sole author of the "Waverley novels," a fact long before established to the public satisfaction. His remaining works are the "Chronicles of the Canongate, Second Series" (1828); "Tales of a Grandfather," first, second, and third series

(1827-'9), devoted to Scottish history; "Anne of Geierstein" (1829); "The Doom of Devoirgoil" and "The Auchindrane Tragedy" (1830); a "History of Scotland" (2 vols., 1829-'30), in Lardner's "Cabinet Cyclopædia;" "Letters on Demonology and Witchcraft" (1830), published in Murray's "Family Library;" another series of "Tales of a Grandfather" (1830), on French history; and a fourth series of "Tales of my Landlord" (1831), containing "Count Robert of Paris" and "Castle Dangerous." He also furnished the notes and prefaces for a cheap uniform series of the Waverley novels, commenced in 1829 by Robert Cadell, who had purchased half of the copyright; and the profits of the new edition aided very considerably the liquidation of his debts. In his later works he began to give evidence of mental exhaustion, and his bodily health declined under the influence of incessant mental application and confinement. In the winter of 1830-'31 symptoms of gradual paralysis, a disease hereditary in his family, began to be manifested. Abstinence from literary labor was enjoined upon him, and in October, 1831, he sailed for Italy in a ship furnished by the admiralty. Honors seldom paid to literary men awaited him at Naples, Rome, and elsewhere. Feeling that his strength was rapidly failing, he requested to be conveyed at once to his native country, that he might die within sight and sound of the Tweed. The journey was accomplished too rapidly for his strength, and on his arrival in London in June, 1832, he had become insensible to the presence of his friends and relatives. He reached Abbotsford on July 11, seeming to revive a little in the presence of familiar scenes and faces, but soon after relapsed into insensibility, in which condition, after occasional intervals of consciousness, death finally overtook him. He was buried in an aisle in Dryburgh abbey, which had belonged to one of his ancestors, and his memory is perpetuated by a noble Gothic tabernacle erected in Edinburgh in 1844-'6. He had paid at the time of his death upward of £100,000 of his debts, and soon afterward, chiefly through the liberal advances of Cadell, who received in return Scott's share of the profits accruing from copyright property in the Waverley novels, the claims of all his creditors were fully satisfied. His two sons and two daughters survived him, but have since died, leaving no male issue. His eldest daughter was married to John Gibson Lockhart, and their daughter was married to James Robert Hope, who by act of parliament assumed the name of Hope-Scott. She died in 1858, and her only surviving child, Mary Monica, born in 1852, is the last lineal descendant of Walter Scott and the present owner of Abbotsford. The centenary of Scott's birth was celebrated in the principal towns of Scotland in 1871.—Scott was tall and vigorous, and in walking betrayed his lameness only by a slight sinking of the right limb. His head was long and cylindrical, his

complexion fair, and his eyes, surmounted by large bushy eyebrows, small and gray. The expression of his countenance was somewhat heavy, but in conversation or in moments of relaxation it lightened up with great animation. Of his generosity, his affability, his passion for field sports, his love of dogs and horses, and the innumerable little traits which endeared him to the domestic circle, as well also as of his strong prejudices, particularly on political subjects (his opinions being strongly tory), many details may be found in the biography by Lockhart, which is the most complete record of his life. A new life of Scott, by Francis Turner Palgrave, was prefixed to a new edition of his poems (London, 1867). His novels have been translated into nearly all the European languages.

SCOTT, Winfield, an American general, born in Petersburg, Va., June 13, 1786, died at West Point, N. Y., May 29, 1866. He was educated at William and Mary college, studied law, was admitted to the bar in 1806, and in 1808 entered the army as a captain of light artillery. While stationed at Baton Rouge, La., in 1809, he was court-martialled for remarks on the conduct of his superior officer, Gen. Wilkinson, and was suspended for one year, which he devoted to the study of military tactics. In July, 1812, he was made lieutenant colonel, and ordered to the Canada frontier. Arriving at Lewiston while the affair of Queenstown heights was in progress, he crossed the river, and the field was won under his direction; but it was finally lost, and he and his command were taken prisoners, from the refusal of the troops at Lewiston to cross to their assistance. In January, 1813, he was exchanged and joined the army under Gen. Dearborn, as adjutant general with the rank of colonel. In the attack on Fort George, May 27, he was severely hurt by the explosion of a powder magazine. In the autumn he commanded the advance in Wilkinson's descent of the St. Lawrence—an operation directed against Montreal, but which was abandoned. In March, 1814, he was made a brigadier general, and established a camp of instruction at Buffalo. On July 3 Scott's and Ripley's brigades, with Hindman's artillery, crossed the Niagara river and took Fort Erie and a part of its garrison. On the 5th was fought the battle of Chippewa, resulting in the defeat of the enemy (see *CHIPPEWA*), and on July 25 that of Lundy's Lane, or Bridgewater, near Niagara Falls, in which Scott had two horses killed under him, and was twice severely wounded (see *LUNDY'S LANE*). His wound of the left shoulder was critical, his recovery painful and slow, and his arm was left partially disabled. At the close of the war Scott was offered and declined a seat in the cabinet as secretary of war, and was promoted to be major general, with the thanks of congress and a gold medal for his services. He assisted in the reduction of the army to a peace establishment, and then visited Europe

in a military and diplomatic capacity. He returned to the United States in 1816, and in 1817 married Miss Mayo of Richmond, Va. A part of his time he now devoted to the elaboration of military manuals. In 1832 he set out with a detachment to take part in the hostilities against the Sacs and Foxes, but the capture of Black Hawk ended the war before Scott's arrival on the field. In the same year he commanded the federal forces in Charleston harbor during the nullification troubles, and his tact, discretion, and decision did much to prevent the threatened civil war. In 1835 he went to Florida to engage in the war with the Seminoles, and afterward to the Creek country. He was recalled in 1837, and subjected to inquiry for the failure of his campaigns, the court finding in his favor. In 1838 he was efficient in promoting the peaceful removal of the Cherokees from Georgia to a new reservation beyond the Mississippi. The threatened collision with Great Britain, growing out of the disputed boundary line between Maine and New Brunswick, was averted in 1839, mainly through the pacific efforts of Scott, and the question was finally settled by the Ashburton treaty of 1842. By the death of Gen. Macomb in 1841 Gen. Scott became commander-in-chief of the army of the United States. In 1847 he was assigned to the chief command of the army in Mexico. Drawing a portion of Taylor's troops and assembling his force at Lobos island, on March 9 he landed 12,000 men and invested Vera Cruz. On the 26th the castle of San Juan de Ulua capitulated, and on the 29th the garrison of 5,000 men grounded their arms outside of the city. On April 8 Scott advanced toward Jalapa, and on the 18th fought the battle of Cerro Gordo, driving Santa Anna from his strong position in the defile formed by the Rio del Plan, and capturing Jalapa on the 19th, Perote on the 22d, and Puebla May 15, where he remained for reinforcements till Aug. 7. On the 10th his force, numbering 10,748 men, was in front of Mexico. Advancing by the Acapulco road, he was opposed by Gen. Valencia with 7,000 picked men supported by a reserve of 12,000 under Santa Anna, but on Aug. 20 successively carried Contreras and Churubusco (see *CHURUBUSCO*), and could have taken the capital; but an armistice till Sept. 7 was agreed upon, to allow the peace commissioner, Mr. N. P. Trist, an opportunity to negotiate. At its close operations began on the S. W. avenue of the city, defended by 14,000 Mexicans occupying the wooded and strongly fortified eminence of Chapultepec. On Sept. 8 Gen. Worth with 3,500 men attacked this position, capturing much matériel and more than 800 prisoners, but losing one fourth of his command, including 58 officers. On the 13th Chapultepec was stormed and carried, and on the morning of the 14th Scott's army marched into the city and ran up the United States flag on the national palace. There was some street fighting and firing upon the

troops from the buildings, but this was soon suppressed, order was established, and a contribution levied on the city of \$150,000, two thirds of which Gen. Scott remitted to the United States to found military asylums. Taxes were laid for the support of the army, and a civil organization under the protection of the troops was created. The treaty of Guadalupe Hidalgo, negotiated by Mr. Trist, was signed on Feb. 2, 1848, and soon after Mexico was evacuated by the United States troops. A court of inquiry into the conduct of the war only redounded to the fame of Scott. In 1852 he was the candidate of the whig party for the presidency, and received the electoral votes of Vermont, Massachusetts, Kentucky, and Tennessee, all the other states voting for the democratic candidate, Gen. Pierce. In 1859 Gen. Scott as commissioner successfully settled the difficulty arising from the disputed boundary line of the United States and British America through the straits of Fuca. Age and infirmity prevented him from taking an active part in the civil war, and on Oct. 31, 1861, he retired from service, retaining his rank, pay, and allowances. Soon afterward he made a brief visit to Europe, and he passed most of the remainder of his days at West Point, where he was buried.—He was the author of a pamphlet against the use of intoxicating liquors (1821); "General Regulations for the Army" (1825); "Letter to the Secretary of War" (1827); "Infantry Tactics," translated from the French (1835); "Letter on the Slavery Question" (1843); and "Memoirs of Lieut. Gen. Scott, written by Himself" (2 vols. 12mo, 1864). Biographies of him have been written by E. D. Mansfield (1846), J. T. Headley (1852), and O. J. Victor (1861). See also "Campaign of Gen. Scott in the Valley of Mexico," by Lieut. Raphael Semmes (1852).

SCOTT-SIDDONS, Mary F. See supplement.

SCOTUS, Duns. See DUNS SCOTUS.

SCOTUS, John. See ERIGENA.

SCOTGAL, Henry, a Scottish clergyman, born at Saltoun, East Lothian, in June, 1650, died in Aberdeen, June 13, 1678. He was the son of Patrick Scougal, bishop of Aberdeen. In 1669 he became professor of philosophy there, and in 1674 professor of divinity. His chief work is "The Life of God in the Soul of Man," edited by Bishop Burnet (1671), which has been many times reprinted.

SCRANTON, a city of Luzerne co., Pennsylvania, on the left or S. E. bank of the Lackawanna river, 105 m. N. by W. of Philadelphia; pop. in 1853, about 3,000; in 1860, 9,223; in 1870, 35,092, of whom 15,887 were foreigners, including 3,056 Germans, 1,445 English, 6,491 Irish, and 4,177 Welsh. It occupies the plateau at the confluence of Roaring brook and the Lackawanna, is handsomely laid out, with wide straight streets, and is lighted with gas and well supplied with water. It contains many fine residences and public buildings, but its general appearance is sombre. Its importance

is due to its situation in the most northern of the anthracite basins and to its railroad facilities. Five lines centre here, viz.: the Delaware, Lackawanna, and Western, the Pennsylvania coal company's railroad, the Lehigh and Susquehanna, the Delaware and Hudson, and the Lackawanna and Bloomsburg. The trade in mining supplies is extensive, and the shipments of coal are immense. Its manufactures, especially of iron, are also large. There are blast furnaces, rolling mills, founderies, machine shops, saw mills, flouring mills, breweries, gunpowder works, &c. The city has 12 banking institutions, with an aggregate capital of \$1,351,450; a hospital and a home for friendless women and children; excellent public schools, with about 7,500 pupils; several private schools and academies; two daily and seven weekly (two German and one Welsh) newspapers; and 31 churches, in five of which the services are in German and in seven in Welsh.—Scranton was incorporated as a borough in 1854 and as a city in 1866. It has grown with great rapidity, its site having been occupied by a farm and a swamp previous to 1844, when a rolling mill was started.

SCREAMER, the name of a group of South American wading birds, of the subfamily *palamedeina*, so named from the loudness and shrillness of the voice. The bill is short, elevated, and curved like that of a gallinaceous bird; nostrils large and exposed; wings long, with the shoulder armed with two or three strong spurs; tail moderate and rounded; tarsi long, strong, with numerous small scales; toes long, the anterior united by a short membrane, and the claws long and curved.—In the genus *palamedea*



Horned Screamer (*Palamedea cornuta*).

medea (Linn.), the third and fourth quills are the longest, and the forehead is ornamented by a slender cylindrical horn; the lores are feathered. The horned screamer (*P. cornuta*, Linn.), or *kamichi*, is larger than a goose, about 3½ ft. long, blackish with a red spot on each shoulder,

and lower parts from the breast white; the bill is black and $2\frac{1}{4}$ in. long, the horn 3 in. and movable in all directions, and the largest spur $1\frac{1}{2}$ in. They live generally in pairs in the undated districts of Brazil and Guiana, especially near the sea; they are shy and timid, and have a very piercing voice, uttered at the slightest alarm; they occasionally perch on trees; the food consists of aquatic seeds and plants, and perhaps of reptiles. They are strictly monogamous. The nest is made on or near the ground, in the form of an oven; the eggs are two, as large as those of a goose, and the young are abroad by January or February; the flesh of the young is good eating.—The faithful screamer (*channa chavaria*, Ill.) is nearly 3 ft. long, of a blackish lead color, with a white spot at the back of the wings and another at the base of some of the large quills; there is no horn on the head, and the occiput is adorned with a circle of erectile plumes, the other feathers of the part being downy; the collar is black. It possesses the singular power of inflating the skin of the body and legs with air. It is a native of South America as far south as Paraguay, and the food consists of aquatic plants. They are easily domesticated.

SCREW, a device constituting one of the mechanical powers. It is in two forms: one, known as the external, convex, or male screw, is a cylinder of wood or metal surrounded with either a spiral groove or ridge, which makes equal angles with lines parallel to the axis of the cylinder; the other, called the interior, concave, or female screw, is a hollow cylinder with grooves around its interior fitted to the ridges of the corresponding solid screw. When very short and used as a fastening upon the external screw, it is called a nut. The spiral ridges are called the thread of the screw, and these are made more or less close together according to the purposes for which the screw is designed. The action of the screw is indefinitely extended and its power increased by adding to it a wheel and axle, so arranged that the teeth of the wheel engage in the threads of the screw and are brought round continually while the screw is made to turn in a fixed position against the wheel. In this arrangement it is known as the endless screw. (See MECHANICS.) The small screws in general use, answering instead of nails, are commonly known as wood screws, and are made of all sizes from 3 or 4 in. in length to $\frac{1}{4}$ in. or less. Screws of the same character for the special uses of the watchmaker and instrument maker are of still smaller sizes. The wood screw tapers slightly from the head downward, and the thread usually occupies about two thirds of the length from the point. The under side of the head is of a true taper, and when the screw is set in its place accurately fits the hole that has been rimmed out for it to the same taper. The upper side is flat, and is crossed by a narrow slit for the edge of the screw driver, by which it is turned

round. The most approved form has the gimlet point, which allows of the screw entering the wood without first boring a hole for its reception. The thread is a thin fillet left by removing the intervening metal.—Several methods have been devised for making screws. By one, now rarely used, the cylindrical lengths cut from rolled iron or iron wire were at a red heat headed in dies, and the thread was then cut by a file, its place being previously marked around the cylinder by one of several devices employed for this purpose. By the machine process in use in Birmingham, England, the first operation consists in clipping off the pieces from a coil of wire and striking up each piece at one end to form the head. The blanks thus formed are in the next operation placed one at a time in a lathe, and proper shape is given to the head and neck by cutting away the superfluous metal. Each blank is then placed by hand in a receptacle which holds it firmly, and is raised by a lever so as to present the head to a steel circular saw, which cuts in an instant the slit for the screw driver. The cutting of the thread, called worming, is done in a lathe, the mandrel of which at one end carries an iron box which works upon a fixed regulating screw. This gives the required longitudinal movement to the blank which is secured to the other end of the mandrel, and is pushed by the revolution point first through the steel cutters. These are made by levers to press more or less firmly upon the blanks, and their action is to turn out a shaving of the metal, leaving a sharp thread or worm. By other methods the cutters are dies having the same thread as the required screw, and corresponding for external screws to the nut or tap, except that they are either in two or four parts, which may gradually be brought together to close the circle while the shank of the blank is worked down in them to the size required. Each variety of screw in this method of cutting requires its own die, and various sizes are cut by hand with dies. Internal screws are cut by steel tools called taps, having the thread of the corresponding external screw, but partly cut away along the whole length in order to produce cutting edges and afford room for the escape of the shreds of metal removed.

SCREW PROPELLER. See STEAM NAVIGATION.

SCRIBE, Augustin Eugène, a French dramatist, born in Paris, Dec. 24, 1791, died there, Feb. 20, 1861. He studied law, and produced at the age of 20 *Les dervis*, a light comedy, which failed. His next attempts were scarcely more successful, and some of his plays were hissed. Finally he wrote, in conjunction with Delestre Poirson, *Une nuit de la garde nationale*, which succeeded. In 1816 he brought out *Le nouveau Pourceaugnac* and *Le solliciteur*, which Schlegel thought better than Molière's *Misanthrope*. A new theatre having been established in 1820 by his friend Poirson, he was engaged to write exclusively for it, and

within ten years (1821-'30) produced over 100 plays, many of which are still considered masterpieces of their kind, such as *Le mariage enfantin*, *La loge du portier*, *La reine de seize ans*, *La marraine*, and *Le mariage de raison*. In many of his plays he was assisted by several other dramatists, the chief of whom were Germain Delavigne, Mélesville, Dupin, Varner, Carmouche, and Bayard. In 1822 he brought out at the Théâtre Français the drama of *Valérie*, the success of which was mainly due to the acting of Mlle. Mars. He also produced there, among other plays, *Une passion secrète* (1834); *Le verre d'eau* (1842); *Adrienne Lecouvreur* (with Legouvé, 1849); *La bataille de dames* (1851); *Mon étoile* (1853); and *Les doigts de fée* (with Legouvé, 1858). He wrote the libretti of *La dame blanche* for Boieldieu; *La neige*, *Fra Diavolo*, *Le domino noir*, *La sirène*, *Haydée*, *La Circassienne*, *La fiancée du roi de Garbe* (produced in 1864), and other operas, for Auber; *La fée aux roses* and *Le Juif errant*, for Halévy; *Les vèpres siciliennes*, for Verdi; *Les martyrs* and *Don Sébastien*, for Donizetti; and *Robert le Diable*, *Les Huguenots*, *Le prophète*, *L'étoile du Nord*, and *L'Africaine* (posthumously produced in 1865), for Meyerbeer; besides writing a great number of libretti for Massé, Adam, Clapisson, Boisselot, Balfe, Thomas, Offenbach, and other composers. He also wrote several novels, as *Carlo Broschi*, *Une maîtresse anonyme*, and *Piquillo Alliaga*. In 1836 he was elected to the French academy. At an early stage of his career he had secured a competence by his literary labors; his wealth increased afterward at a rapid rate, and he left a large fortune. As early as 1836 a catalogue of his works filled 36 columns of *La France littéraire*; now the whole number of his plays alone is estimated at more than 350. These have been printed separately, and in various dramatic collections. The first complete edition of Scribe's works is now in course of publication in Paris (vols. xi. and xii., 1875), to be comprised in 50 volumes.

SCRIBES (Heb. *sopherim*), a learned order among the ancient Hebrews. It was their duty to keep the official records of the kingdom, to make transcripts of the law, and to expound and teach it. In the time of David the name of a scribe is mentioned among the high officers; and under his successors they constituted a much esteemed and highly influential body, recognized and supported by the state. In the later times of the nation they recorded and expounded the oral traditions. In the New Testament they appear as a body of high officers, members of the sanhedrim.

SCRIPTURES, Holy. See BIBLE.

SCRIVEN, an E. county of Georgia, bordering on South Carolina, bounded E. by the Savannah river, and S. W. by the Ogeechee; area, 540 sq. m.; pop. in 1870, 9,175, of whom 4,888 were colored. The surface is level and the soil sandy. Pine timber is exported largely. It

is traversed by the Central railroad of Georgia. The chief productions in 1870 were 153,242 bushels of Indian corn, 10,962 of peas and beans, 30,789 of sweet potatoes, 3,086 bales of cotton, and 12,552 gallons of molasses. There were 609 horses, 565 mules and asses, 3,067 milch cows, 6,049 other cattle, 3,225 sheep, and 9,416 swine. Capital, *Sylvania*.

SCRIVENER, Frederick Henry, an English clergyman, born at Bermondsey, Surrey, Sept. 29, 1813. He graduated at Trinity college, Cambridge, in 1835, was appointed assistant master of the king's school, Sherborne, and in 1839 became curate of Sandford Orcas, Somerset. In 1846 he was appointed head master of Falmouth school, and since 1861 has been rector of Gerrans, Cornwall. In 1870 he was chosen one of the company of revisers of the authorized version of the New Testament. His publications include "A Supplement to the Authorized Version of the New Testament" (1845); "A Collation of about Twenty Manuscripts of the Greek Testament deposited in England" (1853); "Contributions to the Criticism of the New Testament, being the Introduction to the Codex Augiensis and Fifty other Manuscripts" (1859); *Novum Testamentum Græcum*, text of Stephens of 1550, with various readings of Beza, Tischendorf, Tregelles, &c. (1860; new ed., 1867); "Plain Introduction to the Criticism of the New Testament" (1861); "Full Collation of the Codex Sinaiticus with the Received Text of the New Testament, with Critical Introduction" (1863); and "Bezæ Codex Cantabrigiensis, 1581, edited with Prolegomena, Notes, and Facsimiles" (1864).

SCRIVENERS' PALSY, or *Writers' Cramp*, a deranged condition of the motor nerves distributed to the muscles of the fingers and thumb holding the pen. It often completely prevents writing, and, although not precisely paralysis, is equivalent to it. There appears to be a want of coördination of the muscular movements engaged in writing, and in this respect it has some connection with locomotor ataxy. The constant employment of the same movements creates an irritation, which is often attended by pain and excites uncontrollable movements in the thumb and index finger, causing motions which make the writing illegible. A persistent attempt to write only increases the irritation and confusion, and the irregular contractions extend from the muscles of the fingers to those of the forearm and even the upper arm. The disease often attacks musicians, sempstresses, milkmaids, shoemakers, and nail smiths, and therefore it has also been known under the names cobbler's spasm and milkers' spasm. It is more frequent among men than among women, and most common between the ages of 30 and 50. It chiefly attacks clerks, teachers, and professional penmen, and most frequently those who pay little regard to the mechanism of writing. Rest and a good diet, with tonics, particularly iron, form the most rational gen-

eral treatment. Niemeyer found benefit in the use of the galvanic current, which may be passed from above on the muscles of the fore arm, the tendons of which pass to the thumb and index finger. Strychnine has sometimes produced good results, and where the patient labors under malarious influence the use of quinine has been found beneficial.

SCROFULA, a blood disease manifesting itself in a great variety of organs, and characterized when fully developed by the presence of a peculiar unorganized matter termed scrofulous. The name is supposed to be derived from the Latin *scrofa*, a sow, that animal being regarded as especially liable to humors of a similar character. It was called *struma* by Celsus, Pliny, and other Latin writers, from *struere*, to heap up. The disease is transmitted from parent to child, though like other hereditary diseases it frequently passes over one generation to attack the next. It is closely allied to pulmonary consumption; consumptive parents have often a scrofulous or strumous progeny, and *vice versa*. A damp cold atmosphere is favorable to its development, while it is probable that overcrowding and want of ventilation, aided by unwholesome and insufficient food, may originate it *de novo*. When the predisposition to the disease exists, everything that tends to depress the vital forces exercises an unfavorable influence.—The scrofulous habit, when strongly marked, is easily recognized. If the skin be fair, the complexion is often peculiarly brilliant, but the color seems laid on in one large patch, leaving the surrounding skin of an unnatural whiteness; the wings of the nose are thick, the upper lip often swollen, and the lips become cracked and rough on exposure to cold. The skin is unusually delicate and irritable; the patient suffers very readily from chilblains, and in childhood is more liable than others to cutaneous diseases. The mucous membranes partake the delicacy and irritability of the skin. The edges of the eyelids are apt to be red and swollen; the eye is very liable to be attacked by a peculiar inflammation (see OPHTHALMIA); hæmorrhage from the nose, cold in the head, and enlarged tonsils are frequent. The muscles commonly want firmness, and the whole system is deficient in stamina. Sometimes the scrofulous diathesis is marked by a dark complexion, a rough, dry skin, and a pasty, unhealthy look; the movements are sluggish, the habit of body indolent, and the intellect dull. When scrofula is fairly developed, its essential element is the deposition of an unorganized, brittle material, generally of the consistency of new cheese. In the lungs the presence of this matter constitutes tubercular consumption; in the mesenteric glands, *tabes mesenterica*; in the arachnoid membrane of the brain, acute hydrocephalus; in the lymphatic glands, bones, &c., scrofula. Scrofula is eminently a disease of childhood, while consumption belongs to a later period; but neither is confined to any age. One of the forms in which scrofu-

la most commonly and earliest shows itself is swellings of the lymphatic glands in various parts of the body, more particularly about the neck. These become enlarged and firmer, and after a time a deposition of the peculiar curd-like matter is found to have taken place in their interior. After a time suppuration occurs, the swellings become softer, and the skin over them assumes a dusky red hue, gradually becomes thinner, and finally bursts, giving outlet to an unhealthy pus mixed with the curd-like deposit of the disease. The ulcers thus left heal slowly and with difficulty, and unless great care is exercised produce deformed cicatrices. Occasionally, but rarely, scrofulous glands undergo a process of cure without the occurrence of suppuration, the swelling gradually subsiding, and the tuberculous matter, by the absorption of its thinner part, being converted into a chalky concretion.—In the management of strumous infants much can be done to guard against the development of the disease. If the mother be affected, a healthy wet nurse if possible should be employed; the sleeping room of the child should be large and well ventilated; it should be bathed daily, at first in warm, and as it acquires strength in cold water, well dried, and thoroughly rubbed; it should be warmly clothed, and exposed as much as possible to the light and air. As it advances in age, the diet should be simple and digestible, but abundant and nutritious; the child should have reasonable but not excessive exercise, and should be in the open air as much as possible; while if it be, as is frequently the case, bright and precocious, great care should be taken not to stimulate its intellect too early and too much. When the disease shows itself, a residence by the seaside during summer is frequently of service. Remedial agents are to be sought in the preparations of iron and iodine, in quinine and the bitter tonics.

SCRUPLE (Lat. *scrupulum*, a little pebble), a weight equal to the third part of a dram or the 24th part of an ounce, as used by apothecaries. The *scrupulum* (also written *scripulum* and *scriptulum*) was $\frac{1}{24}$ of the Roman *uncia*, and afterward $\frac{1}{60}$ of an hour. The 60th part of this was *scrupulum secundum*, and the 60th of this *scrupulum tertium*, whence our terms seconds and thirds applied to these divisions.

SCUDDER, John, an American missionary, born in New Brunswick, N. J., Sept. 3, 1793, died at Wynberg, Cape of Good Hope, Jan. 13, 1855. He graduated at Princeton in 1813, studied medicine, and settled in New York. He subsequently offered himself to the American board as a missionary, studied theology, and in 1819 was ordained as a minister of the Reformed Dutch church on board the ship which carried him to India. For 19 years he labored in Ceylon, where he conducted a large hospital. In 1839 he was transferred to Madras. In 1842 he visited America, and after his return to India in 1846 resumed his labors, but in 1854 went for his health to the Cape of Good

Hope. He published "The Redeemer's Last Command," "The Harvest Perishing," "An Appeal to Mothers," "Knocking at the Door," "Passing over Jordan," "Letters to Children on Missionary Subjects," "Grandpapa and Little Mary," &c.—His eight sons and two daughters all became missionaries. One, the Rev. Henry Martyn Scudder, returned to America in 1864, and became pastor of a Presbyterian church in San Francisco in 1865, and of a Congregational church in Brooklyn in 1871.

SCUDÉRY, or **Sendérl**. **I. Georges de**, a French author, born in Havre about 1601, died in Paris, May 14, 1667. After serving without distinction in the army, he became known by attacks upon Corneille's *Cid*, and by his devotion to Richelieu, who had him admitted to the academy, and appointed governor of a small fortress near Marseilles; and in 1662 he received a pension of 600 livres. His factitious reputation was increased by his name being published as the author of his sister's most celebrated works, though they were mainly written by her alone. Boileau finally destroyed the ephemeral prestige of his plays and of his epic *Alaric*. **II. Madeleine de**, Mlle., a French authoress, sister of the preceding, born in Havre, June 15, 1607, died in Paris, June 2, 1701. She was called "another Sappho" and a "tenth muse," although her excessive mannerism injured the hôtel Rambouillet, where she was conspicuous, and Boileau satirized her exaggerated sentimentality. But her romances, *Ibrahim* (4 vols., 1641), *Artamène, ou le grand Cyrus* (10 vols., 1649-'53), and *Clélie* (10 vols., 1656; new ed., 1731), enjoyed great popularity on account of their delineations of contemporary characters, especially *Artamène*, which served as the basis of Cousin's *Société française du 17^e siècle* (1858). Among her other writings are *Almahide, ou l'Esclave reine* (8 vols., 1660); *Discours sur la gloire* (1671), which received the first rhetorical prize ever awarded by the academy; *Conversations sur divers sujets* (4 vols., 1680-'84); *Conversations de morale* (4 vols., 1686-'8); and letters which, though not collected, are among her brightest efforts. A selection from her writings appeared in 1766, and in many later editions, under the title of *Esprit de Mademoiselle de Scudéry*; and a memoir of her was published in Paris in 1873.

SCULPIN. See **BULLHEAD**.

SCULPTURE (Lat. *sculpere*, to cut out, to carve), literally, the art of cutting or carving any substance into images. The term is used generally to indicate any process by which the forms of objects are represented by solid substances, and therefore includes carving, modelling, casting, whether in metal or other materials, and gem engraving. Sculptured images consist either of insulated figures or parts of figures or groups, technically called the "round;" of figures attached to a background, from which they are more or less raised, and designated according to the degree of the "relief," as it is termed, *alto rilievo*, *basso ri-*

lievo, and *mezzo rilievo*; or of figures which, without projecting from the face of the original ground, have their outlines sunk into it, and are rounded on the principles of *basso rilievo*. This method of working occurs chiefly in Egyptian sculpture, and may be termed *relieved intaglio*. The materials employed by the sculptor include almost every substance capable of being carved, cast, or moulded. For carving, porphyry, basalt, granite, marbles of many varieties, alabaster, ivory, bone, and wood have been in use from a remote period, the three first named substances being those used by the Egyptians, while the Greeks and Romans worked chiefly in marble. Of the latter material, that most esteemed by the ancients was the pure white marble found in the island of Paros, and thence called Parian, next to which in quality was that procured from Mounts Pentelicus and Hymettus in the neighborhood of Athens. The finest Italian marble was the Carrara, which still maintains its old celebrity; but many Roman sculptors wrought from marbles procured in Africa. The finest marbles in modern use are from Italy. Alabaster sculpture is best illustrated by specimens exhumed at Nineveh. Wood was chiefly employed in the primitive stages of the art, and the kinds most in vogue were oak, cedar, cypress, sycamore, pine, box, fig, and ebony. Few works of this description are extant, notwithstanding Pliny and other ancient authors speak of the durability of ebony, cedar, and other species. Occasionally figures for special purposes, as funeral ceremonies, were made of aromatic gums, and even of hay. For modelling, clay, stucco, plaster, and wax were used in the infancy of the art; and images of baked clay, known as terra cotta work, were indefinitely multiplied by means of moulds of the same material, into which the soft clay was pressed. Terra cotta was used for an infinite variety of purposes besides statuary, the objects formed from it being generally small and painted, and of a hardness, produced by the action of fire, almost equalling that of stone. The metals employed in casting are gold, silver, iron, tin, copper, lead, and their compounds. Electrum, a substance formed of one part of gold to four parts of silver, was used as remotely as the Homeric age; but the composition called by the Greeks *χαλκός*, by the Romans *æs*, and by the moderns bronze, has in all ages been preferred for the purposes of sculpture to any other metal, and the greater part of the antique statues and sculptured ornaments now extant have been formed from it. From the varieties mentioned by ancient writers, it appears that many centuries before the Christian era a very considerable degree of skill had been acquired in its preparation; and the colossal proportions of many of the bronze works extant or on record point to a facility in the processes of casting not inferior to the art of modern times. Metal statues, however, were not always cast, but, in the earlier ages

at least, were made of small plates hammered into the desired shape, and fastened by nails or cramps, or of solid pieces beaten into shape. Sometimes, according to ancient authors, peculiar effects of color, such as a blush or pallor upon the cheeks, were given by Greek sculptors to works of this class by a fusion of different metals; but the descriptions by Plutarch and others do not afford a very satisfactory account of the process, and it seems more probable that the statues were colored after being cast, as Pliny says was the practice with the Egyptians. Coloring was not confined to bronzes, but among eastern nations, as well as with the Greeks, statues in marble and other materials were frequently heightened by color and a profusion of ornament, whence they were termed by the Greeks polychromic. When different kinds of marble or stone and of different colors were combined in the same work, it was called polythitic, to distinguish it from the simpler monolithic sculpture. Both methods are distinct from the so-called toreutic art of the ancients, which included the working of precious metals combined with other substances, as exemplified in Homer's description of the shield of Achilles. The Greek sculptors sometimes introduced foreign substances into marble statues, as precious stones or glass for eyes. A species of sculpture called chryselephantine, in which the flesh parts of the figure were of ivory and the draperies of gold, was also employed by the Greeks for statues of tutelar divinities intended to testify to the wealth, liberality, or piety of a state or individual. The statue of the Olympian Zeus by Phidias affords the most illustrious example of this.—Sculpture was probably the earliest developed of the imitative arts. So far as experience has shown, it had no special birthplace, but sprung up naturally in all parts of the world, taking its origin everywhere in the imitative faculty of man, although the practice of it in certain countries was undoubtedly influenced by the higher civilization of others. The first efforts in sculpture were probably monumental. A block of stone rudely fashioned into some simple form, or even a pile of stones, originally sufficed for a memorial; and repeated instances occur in the Mosaic history of the erection of monuments of this kind. The next step may be traced to the desire in a primitive state of society for some visible, tangible object representing the deity commonly worshipped. But as the deities worshipped by the earliest races were heavenly bodies or abstract qualities, such representations could only be symbolical; hence in all probability the first statues of gods were simple pillars of stone having no resemblance to the human figure, and indicating their purpose only by certain marks or hieroglyphics carved upon them; and the first statues fulfilling in any considerable degree the conditions of art were of men distinguished as heroes, benefactors, or founders of nations. When in process of time such indi-

viduals became invested with divine attributes, the visible representation of their forms as objects of worship became necessary, and sculpture first assumed its legitimate functions. The art, thus early associated with religious worship, was naturally considered inapplicable to ordinary purposes, and in many instances was wholly controlled by hierarchical influence. The supernatural character assigned by grossly superstitious races to the forms of these newly created deities, as exemplified in the monstrous creations of the Chinese, Hindoo, and Egyptian mythology, was gradually embodied in certain fixed types from which no deviation was permitted; and this circumstance, together with the limited field of practice, caused sculpture in many parts of the world to remain almost from its birth a mere mechanical art.—The first artists on record as sculptors are Bezaleel and Aholiab (about 1500 B. C.), who made the ornaments of the tabernacle (Exod. xxxi.), although long previous to their time the art of working in metal, stone, and wood was known to various eastern nations. Abundant passages in the Old Testament show that the Hebrews practised it with success, as did also the Phœnicians; but no specimens of the sculpture of either nation remain. Of Assyrian sculpture nothing was known from actual observation previous to the excavations of Botta, Layard, and their successors, by which the arts of a race whose history is lost in the mythical ages have been suddenly and minutely brought to light. The specimens exhumed are for the most part bass reliefs on alabaster slabs, the subjects delineated being colossal human-headed bulls and other grotesque personages from the Assyrian mythology, battles, hunting scenes, processions, ceremonials, &c., executed according to a code of conventional rules. (See NINEVEH.) Although none of them can be assigned a high rank as works of art, the spectator cannot but be struck by the majesty and even the severe grandeur of some of the larger figures, and by the skill with which the characteristics of individual animals and the details of elaborate compositions are represented. The Assyrians also excelled in bronze castings. Of the wonders of Babylon and the perfection to which the Chaldeans carried the art of casting in bronze and the precious metals, we know nothing beyond the accounts of Herodotus and other ancient writers. Among the Persians sculpture was never employed for religious purposes, and the art as practised by them was evidently derived from the Assyrians. Worshipping no deity which could be represented by any form, they regarded images of gods as marks of barbarism and impiety; and wherever they appeared as conquerors such works, with the temples enclosing them, were invariably destroyed. But their art, notwithstanding it was unrestrained by hierarchical influences, was never marked by taste or in any sense progressive. The sculptures of Persepolis represent principally processions

and combats, the figures in which are heavily draped and exhibit little variety, action, or character. The sculpture of the remoter eastern nations, including the Chinese and Hindoos, has little to recommend it in the qualities of art, and affords no assistance in tracing the history of our subject. The hierarchical authority, by confining its exercise to mythological subjects, prevented it from becoming imitative or progressive. In vastness of scale and the sentiment of repose the Hindoo sculptures at Ellora, Elephanta, and elsewhere, are equal to the productions of any Asiatic race.—The Egyptians, perhaps more than any other nation of antiquity, associated the practice of sculpture with religious worship; hence most of their extant works of this class comprise conventional representations of deities and their attributes or qualities. Recent discoveries, however, show that their earliest sculptures were free from restraint, and represented animate and inanimate forms with great accuracy; whence the remark of Lenormant: "Alone of all the world the Egyptians began with living reality to finish with hieratic convention." A striking example of their early proficiency is afforded in a wooden statue of one Ra-em-ke, preserved in the museum at Boolak near Cairo, and attributed to the era of the fifth dynasty, or nearly 4000 B. C. (according to Mariette). The body is admirably modelled, and the head life-like. This primitive art period expired with the sixth dynasty, and from the eleventh dynasty, or formation of the middle empire, about 3000 B. C., Egyptian artists formed a sort of hereditary craft, whose labors, controlled by a rigid code of rules prescribed by the sacerdotal authority, exhibit a uniformity of results so striking as to justify the statement that until the conquest of the country by the Macedonian Greeks, 332 B. C., a period of nearly 2,800 years, there was but one epoch in Egyptian sculpture. A Græco-Egyptian style succeeded with the Ptolemies, and expired with the art itself. Not only were the artists forbidden to make innovations, but they were never allowed, Plato tells us, "to invent any new subjects or any new habits. Hence the art remains the same, the rules of it the same." The standard types of form were archaic in character and deficient in action and expression, which will account for the utter absence of anything approaching grace, symmetry, or elegance in Egyptian art. The figures are generally equally poised on both legs, one of which is sometimes slightly advanced; the arms either hang down straight on each side, or if one be raised, it is at a right angle across the body; and the head looks directly in front. Many statues, however, are seated or kneeling, the former attitude being that in which, on the whole, Egyptian sculptors excelled; and the colossal sitting figures of their kings frequently exhibit grandeur of proportion and repose and dignity of expression. Anatomy was little regarded in

representations of the human form, and the draperies were of the simplest character, frequently falling straight to the ground, without folds. Where elaborate representations in bass relief or intaglio of battles, processions, or religious ceremonies were attempted, greater freedom seems to have been allowed the artist; and in this class of works, as well as in occasional heads, such as the so-called Young Memnon in the British museum, there are evidences of inventive power and a feeling for ideal beauty, which, but for the restraints imposed upon the sculptor, might have borne worthy fruits. Egyptian sculpture of all kinds was usually colored, and statues of the hardest granite, the material most commonly employed, are as cleanly cut as marble and beautifully polished.—Etruscan sculpture, so far as can be ascertained by existing specimens, was connected in a greater or less degree with that of the Greeks, although there is reason to believe that previous to the arrival of Greek colonists in Etruria a purely national style was in existence there. K. O. Müller has observed that the art of the country, being receptive rather than creative, and not indigenous, began to decline as soon as deprived of the Greek influence. The best specimens of Etruscan sculpture in existence are bronze works of the kind known as *Tuscanica signa*, which were highly esteemed by Roman connoisseurs. They are characterized by a stiff, archaic style resembling the early Greek, which seems to have been retained as the standard. Well known examples of Etruscan bronzes are the "She Wolf" of the capitol at Rome, and the "Chimæra" at Florence. Innumerable smaller figures have been found, and such was the facility of the people in casting, that after the capture of Volsinii by the Romans, about 280 B. C., 2,000 statues in bronze were carried away by the victors. Etruscan carvings, whether in wood or stone, are unskilful, but their terra cotta vases and ornamental work are of high artistic value. The Etruscan vases, however, so celebrated for their elegance of form and the paintings with which they are embellished, are now believed to be of Greek origin.—In the hands of the Greeks sculpture was brought to a degree of perfection scarcely approached in modern times, and quite as marked, in comparison with the progress of other ancient nations, as their superiority in every department of imitative art and literature. Similar causes contributed to this universal excellence, the principal of which, according to Winckelmann, were the innate genius of the people, their religion, and their social and political institutions. While in the East, and even among the Etruscans, art never advanced beyond the types established almost at its birth, the Greeks, led on by an intuitive sense of beauty, which was with them almost a religious principle, aimed at an ideal perfection, and, by making nature in her most perfect forms their model, "ac-

quired a facility and a power of representing every class of form unattained by any other people, and which have rendered the terms Greek and perfection, with reference to art, almost synonymous." In respect to climate, physical beauty, mechanical ingenuity, or manual dexterity, the Greeks had little if any advantage over contemporary races; and yet, whatever was the purpose to which sculpture was applied, their superiority was indisputable. Like the works of the painters who effected the revival of art in modern times, the sculptures of the best period in Greek history were almost exclusively public, and intended for the moral or religious improvement of the people, or as an incentive to noble deeds. When the sculptor ceased to be influenced by these motives, his art began to decline, as Italian art under similar conditions languished after the brilliant period of Raphael and Michel Angelo. Greek sculpture may be divided into a semi-mythic or archaic period, a period of grandeur and power, a period of refinement or physical beauty, and a period of decline. The remains of the first period are not unlike the earlier attempts of other nations, although at its close, notwithstanding the hierarchical influence, a steady progress toward excellence is discernible. The first sculptors on record are purely mythical, and may be regarded as personifications of particular branches of art, or the representatives of families of artists, rather than actual personages. Such was Dædalus, whose name indicates merely an artist in general, and of whom it has been observed that "the stories respecting him are more like allegorical accounts of the progress of the arts than anything else." For many ages sculptors claimed an actual descent from Dædalus, whence they were called Dædalids; and their works, known as *δαίδαλα*, represent the first attempts to replace the blocks of wood and stone which originally symbolized the images of deities, by statues having some resemblance to life or nature. These were generally of wood, ornamented with gilding, colors, and real drapery, although long before the commencement of authentic history other materials began to be used. Phidon of Argos, who is said to have struck the first money in Greece (748 B. C.), probably introduced the employment of metals in statuary; and the most ancient Greek statue in this material mentioned by classical authors was one in bronze of Zeus, by Learchus of Rhegium, who is supposed to have flourished as early as 700 B. C. This, however, was constructed of thin plates bent into the required shape, and riveted together. Glaucus of Chios or Samos (690) was the reputed inventor of the art of soldering metals; and to Rhœus of Samos, and his son Theodorus, was ascribed the invention of modelling and casting metals, besides other improvements in the art (about 600). Pliny is of opinion that the first marble statues date from the commencement of the Olympiads, although Dipœnus and

Scyllus of Crete, who flourished in the early part of the 6th century B. C., are the first artists who were celebrated for their works in marble. Sculptured figures on architectural monuments were executed as early as the Homeric epoch, such as the two lions in relief on the ancient gate of Mycenæ, which, with other archaic remains of Greek statuary and metal work, reflect, it is asserted, the influence of Assyrian civilization. The period between the age of Homer and the 50th Olympiad (580), comprising about three centuries, witnessed the discovery of the chief processes essential to the practice of sculpture; but, from the restraints imposed by religion, the art made little progress even among the Asiatic Greeks, by whom it was most successfully cultivated. Statues of gods after fixed types were almost the only ones made. Toward the middle of the 6th century those changes took place by which the early archaic style was gradually merged in that of the second epoch. The athletic contests at the public games familiarized the artists with the beautiful forms of the human body, and the practice of erecting statues of the victors in these contests, which began about 550, gave a surprising impulse to the art. The subject, not being religious, admitted of a greater play of inventive powers, and the improvement thus produced in the statues of men was extended to those of gods, which gradually began to assume grace and grandeur. The hereditary cultivation of sculpture, under the influence of which conventional types were carefully transmitted to successive generations, also ceased about this time, and individual artists were left free to follow the dictates of their own genius. These circumstances, with the disastrous consequences to Asiatic art of the Ionian revolt against Darius Hystaspis, and the patriotic spirit evoked by the Persian invasion, gave increasing vigor to sculpture in Greece proper, where the hardness and stiffness of the first period are lost in the grandeur and ideal beauty of Phidias and his contemporaries, who united "the principles and the stability of the Dorian genius with the liberty and grace of the Ionian." Many works in marble and bronze belonging to the latter or transition portion of the archaic period are still extant, the most characteristic being the Selinuntine and Æginetan marbles, now deposited in Palermo and Munich, which formed part of the decorations of temples. Sicyon, Ægina, and Argos had hitherto been the chief schools of the art; but during the period upon which we are now entering, from 480 to about 400 B. C., Athens was its most distinguished seat, her supremacy being disputed only by Argos. The Athenian and Argive sculptors, animated by the intellectual activity which the Persian invasion developed, and which manifested itself not merely in the cultivation of literature and the fine arts, but in all the social and political relations of the Hellenic races, vied with each other in disseminating over

Greece and her colonies a series of works which became the models of form for their countrymen as well as for all succeeding sculptors. Statuary was at this time almost exclusively public, and the chief sculptors, Hegias, Pythagoras of Rhegium, Calamis, Ageladas, Phidias, Agoracritus and Alcamenes, both pupils of Phidias, Myron, and Polyclethus, are known mainly by their statues of gods and heroes and their historical groups for the temples, porticoes, theatres, and gymnasia, built from the spoils of war or the profits of newly developing commerce. Of these Phidias, Myron, and Polyclethus, all scholars of Ageladas of Argos, were the most famous, and their works exhibited the dignity and almost passionless tranquillity of mind characteristic of a heroic age, and of the lofty purposes for which its artists labored. Phidias of Athens, whose name is associated with the noblest architectural monuments and sculptures of the splendid era of Pericles, is generally placed at the head of all the sculptors of antiquity in the qualities of sublimity and severe beauty, his works bearing the same relation to those of subsequent stages of the art that the dramas of Æschylus do to the more polished productions of Sophocles or Euripides. His chryselephantine statues of Athena and the Olympian Zeus, the most celebrated of the kind ever made, exist only in the descriptions of ancient authors; but in the Elgin marbles, executed under his direction and in part perhaps by himself, as has been generally supposed, we fortunately have splendid and characteristic specimens of his genius. (See ELGIN MARBLES, and PHIDIAS.) The Phigalian marbles in the British museum and the casts of the sculptured fragments from the temple of Theseus, in the same institution, are also in the style of Phidias or his school. Myron, who worked chiefly in bronze, was a great master of expression, and, from the frequent and honorable mention of him by classical authors, must have been one of the most esteemed sculptors of antiquity. He was celebrated for his figures of animals, but the *discobolus* or quoit player, of which the palazzo Massimi in Rome and the British museum possess copies, is the only work by which he is now known. Polyclethus, the head of the Argive school, as Phidias was of that of Athens, rivalled his great contemporary in every department of his art, except the representations of gods, in which Phidias was never equalled. He even gained a victory over him in the representation of an Amazon. His statues of athletes were considered the perfection of manly beauty, and a youthful *doryphorus* (spear bearer) was so accurately proportioned as to be a standing model for sculptors. Toward the close of the Peloponnesian war a change took place in the habits and feelings of the Athenian people, under the influence of which a new school of statuary was developed. The people, spoiled by luxury and craving the pleasures and excitements which the prosperity of the

age of Pericles had opened to them, regarded the severe forms of the older masters with even less patience than the austere virtues of the generation which had driven the Persians out of Greece. The sculptors, giving a reflex of the time in their productions, instead of the grand and sublime, cultivated the soft, the graceful, and the flowing, and aimed at an expression of stronger passion and more dramatic action. Jupiter, Juno, and Minerva, the favorite subjects of the Phidian era, gave place to such deities as Venus, Bacchus, and Amor; and with the departure of the older gods departed also the serene and composed majesty which had marked the representations of them. The great sculptors of this period of refinement or sensuous beauty, which begins about 400, were Scopas, Praxiteles, and Lysippus, by whom the art was brought to almost absolute perfection in respect to gracefulness of form and expression and technical qualities. Scopas excelled in single figures and groups, combining strength of expression with grace, rather than in architectural sculpture. The celebrated group of Niobe and her children in the museum at Florence is attributed to him. The *Venus Victria* of the Louvre, called also the Venus of Milo, was formerly also considered his work, but may more reasonably be regarded as a remnant of the sublime style developed under Phidias. The slab from the mausoleum of Halicarnassus, representing the battle of the Amazons, now in the British museum, is undoubtedly from his hand. Praxiteles was almost unrivalled as a sculptor of the female figure, and his statue of the Cnidian Aphrodite, modelled from the courtesan Phryne, was a masterpiece of sensual charms. This work is said to have been the first instance in which any artist had ventured to represent the goddess entirely divested of drapery, and the new ideal thus formed was frequently imitated by succeeding sculptors. It is doubtful whether any copies of it are in existence, although the Venus of the Vatican and that of the museo Pio Clementino are supposed to be such. The works of these two artists were executed chiefly in Parian marble, a material which now came into general use for single figures or groups, while the costly chryselephantine statues, and those made of wood and stone, called acroliths, gradually disappear. While Scopas and Praxiteles represented what is known as the later Attic school, Lysippus of Sicyon carried out the principles of the Argive school of Polyclethus by representing the human form and athletic power in the highest perfection. He paid great attention to details, and by a careful imitation of nature gave a realistic character to his productions, under the influence of which portrait statues began to take the place of ideal creations. He appears to have worked only in bronze, and was the favorite sculptor of Alexander the Great, whose statues he had the exclusive privilege of making. The commencement of the fourth and last period in

Greek sculpture, about 320 B. C., found the schools of Praxiteles and Lysippus in considerable vigor, although the artists contented themselves with imitating their predecessors rather than opening any original path of design. Sculpture consequently began to decline, its decay being hastened by the disturbances which followed the dismemberment of Alexander's vast empire. Until the middle of the 3d century B. C., however, there appears to have been no lack of reputable artists, and new schools sprang up in Rhodes, Alexandria, Pergamus, Ephesus, and elsewhere in the East, the followers of which too frequently lent their talents to the execution of grossly flattering portraits of kings, and other unworthy purposes. The school of Rhodes could boast of Chares, the sculptor of the famous Colossus. To this period are generally attributed by art critics Agesander's group of Laocoön and his sons, which, together with the Farnese bull at Naples, emanated, according to Pliny, from the Rhodian school; the Apollo Belvedere in the Vatican, the "Hermaphrodite" at Paris, the torso of the Belvedere at Rome, the Farnese Hercules, and the "Dying Gladiator." Bronze and marble were the materials principally in vogue, and the former was gradually superseded by the latter. Shortly before the capture of Corinth by the Roman general Mummius, 146 B. C., a transient revival took place in Athens, during which the statue known as the Venus de' Medici was produced by Cleomenes, although according to some authorities it is possibly the work of Alcamenes, the pupil of Phidias; but the reduction of Greece to the condition of a Roman province gave the death blow to the art, which degenerated into a mere handicraft. The ancient seats of civilization, stripped by the conquerors of their choicest art treasures, no longer afforded to the sculptor the models consecrated by time and national pride; and the Greeks, having neither the means nor the high inducements to practise their art at home possessed by preceding generations, transferred their labors in the 1st century B. C. to Italy. —As early as the consulship of P. Cornelius Scipio Nasica, 162 B. C., the city of Rome possessed numerous statues of gods and public men, executed probably by Greek and Etruscan sculptors, the latter of whom had long previously made the Romans familiar with their peculiar artistic creations. The overthrow of Greece and her colonies, however, gave the first impulse to the cultivation of sculpture in Rome; and after the wholesale plundering of Greek cities by Sulla in 86 B. C., a taste for art and for collecting choice specimens of sculpture and painting began to be developed among the wealthy Romans. Toward the close of the republic Rome was full of Greek sculptors, some of whom, without having originality of conception, were not unworthy descendants of the great schools of their native country. A creditable specimen

of their skill is afforded in the so-called statue of Germanicus in the Louvre. Julius Caesar was an intelligent collector of statuary, and during the reign of Augustus the art was liberally encouraged by the emperor and other powerful patrons. Caligula and Nero ransacked Greece for sculptures, and the former introduced the barbarous custom of decapitating the statues of gods and illustrious men for the purpose of substituting his own likeness, in which he was imitated by many of his successors. Down to the time of Trajan, the principal sculptured works consisted of reliefs on public monuments, such as those adorning the arches of Titus and Trajan, and statues and busts of the emperors, many of which are meritorious in point of execution, and display considerable fancy and invention in the treatment. The vigorous character of Trajan gave new life to the arts in Greece and Rome, and his reign and those of his successors Hadrian and Antoninus Pius have been called the golden age of Italian sculpture. Hadrian was one of the most accomplished connoisseurs of the time, as was evinced by the modern excavations at his villa near Tivoli, and by his influence induced contemporary sculptors to exchange the representations of common subjects, to which they had gradually begun to confine themselves, for those more characteristic of earlier artists. The pure Greek style was revived with considerable success, and contemporary with it flourished another, half Greek and half Egyptian, suggested by the recent introduction of the worship of Egyptian deities into Italy. The portrait statues of this period are particularly fine, and the ideal creations, of which the statues and busts of the emperor's favorite Antinous may be regarded as specimens, have been placed on an equality with the works of the most finished Greek period. The efforts of Herodes Atticus, one of the most liberal and enlightened patrons of art on record, also did much to prolong this revival; but after the middle of the 2d century of our era the art exhibited an uninterrupted decline. The sculptures on the arch of Septimius Severus (A. D. 203) are far inferior to the productions of Hadrian's time; and those on the arch of Constantine, erected a century later, show that originality of design and executive ability were then nearly extinct. The dismemberment of the empire completed the destruction of the arts in Italy, and during the troubled ages which succeeded, the finest efforts of the old sculptors fell a prey to barbarian or iconoclastic fury, or were destroyed in conflagrations. Constantinople, in which a vast number of bronzes, marbles, and pictures had been collected by the eastern emperors, continued for several centuries to be almost the only repository of such objects; but the capture of the city by the Latins in 1204 having involved these in destruction, the knowledge of antique art for a time passed away from the world.—Roman

sculpture may be described in general terms as a continuation of that of Greece; the best artists were Greeks, and there is no record of the production of a work of any considerable merit by a native sculptor. Italy nevertheless claims the honor of having been the seat of the revival in modern times, not of sculpture merely, but of all the imitative arts. During the period known as the dark ages the arts were in some degree kept alive by the monks of the early Greek and Latin churches; but a style and treatment founded on new conceptions of the purposes to which art should be applied and guided by Christianity, had gradually superseded those of pagan artists. The general causes which produced this result are enumerated in the article *PAINTING*. With Nicola Pisano, who flourished in the first half of the 13th century, the authentic history of modern sculpture properly begins, notwithstanding the preceding century had witnessed the production of works of decided originality, if rude and repulsive in comparison with the wonders of the Greek schools. The mission of the sculptor was similar to that of the Greek artists in the archaic and Phidian periods; but unlike the latter, who improved upon established types, he was compelled to have direct recourse to nature as it existed about him, the remains of antique art then extant being too insignificant to afford models, and according in no respect with the character of the age. Hence modern sculpture, and indeed every department of modern art, was at the outset as widely separated from that of the Greek schools, as the religion which inspired it differed from every system which had preceded. Nicola and his son, Giovanni Pisano, were among the earliest to practise sculpture as a separate art, and the distinctive character which it assumed in their hands gave the first decided impulse to its cultivation in Italy. Their works, consisting of bass reliefs on the façades and pulpits of churches in Pisa, Orvieto, Siena, and other Italian cities, exhibit a beauty and simplicity of composition, and a force of expression, which abundantly compensate for technical shortcomings. Their conceptions of nature are naïve and original, and there is scarcely a trace of the influence of the antique in their productions or those of their contemporaries, notwithstanding that their superiority to any preceding artist is supposed to have been acquired only by the study of such ancient sculptures as were preserved in Pisa and elsewhere. The art inaugurated by the Pisani was further developed during the succeeding century by Andrea Pisano, who executed in bronze the oldest door of the baptistery of St. John in Florence; by Andrea Orcagna, the Masucci, and others, whose genius was chiefly devoted to monumental sculpture and the execution of elaborate ornaments, bass reliefs, and small figures on altars. Of the latter kind of work the altar in the chapel of San Michele in Florence, by Orcagna, is a celebrated specimen.

At the close of the 14th century sculpture, under the influence given to modern art by Giotto, who in turn owed much to the example of Nicola Pisano, had attained a considerable degree of perfection; but with the commencement of the 15th, which has been called the golden age of modern sculpture, as the 16th was of painting, it entered upon a grander epoch, the chief production of which was Lorenzo Ghiberti's celebrated bronze doors for the baptistery of St. John in Florence, which not only exceeded every previous effort of modern sculpture, but have remained to the present time a masterpiece of the art of bass relief. Among the competitors for the first door of St. John were Donato di Betto Bardi, better known as Donatello, and Brunelleschi, called by the Italians Filippo di Brunellesco, both of whom were the friends and contemporaries of Ghiberti. Brunelleschi was most distinguished as an architect, but Donatello, by his noble statues of St. Mark and St. George, and other works distinguished by bold conception and vigorous execution, gained a foremost place among modern sculptors. Luca della Robbia is celebrated for his groups of the Virgin and Christ, and other sacred subjects, executed in terra cotta, and hardened by a peculiar process, the secret of which is said to have perished with him. Among other sculptors of the 15th century were Simone, the brother, and Giovanni da Pisa, one of the many scholars of Donatello; the Pollajuoli; Andrea Verrocchio, at one time a painter and the master of Perugino and Leonardo da Vinci; and Andrea Ferrucci; all of whom were chiefly employed on sacred subjects for churches and convents. Toward the close of the 15th century sculpture, in common with the other arts, began to feel the influence of the newly awakened taste for the antique; and religious subjects were succeeded by those suggested by classical history or mythology, the treatment being founded upon the ancient marbles and bronzes which the zeal of the Medici and other enlightened art patrons then first caused to be exhumed. But if the classical mode of representation was appropriate to strictly classical subjects, and the study of the antique of advantage with respect to the technicalities of the art, the introduction of pagan forms and ideas into works of a purely Christian character was calculated to check the healthful development which art had already taken, and to weaken its influence in addressing modern sympathies. A pseudo-classical style, founded on mere imitation, uninspired by the sentiment which influenced the ancient artists, and irreconcilable with the spirit of the age, thenceforth made rapid innovations upon the practice of sculpture, and the art, while in the maturity of its promise, began to decline. At this period the most extraordinary character in the history of modern art produced his masterpieces of form. The works of Michel Angelo Buonarroti are beyond comparison the

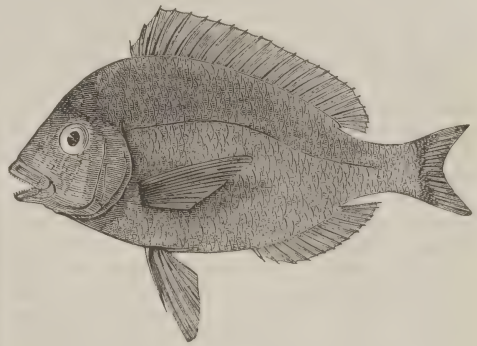
grandest efforts of modern plastic art, and his colossal Moses in the monument of Pope Julius II., his monumental statues of Lorenzo and Giuliano de' Medici, and his group called *La Pietà* in St. Peter's, show that the influences of the antique were unavailing to destroy his original conceptions of character and design. Grandeur and energy of expression and action were his chief characteristics, and his intimate knowledge of anatomy enabled him to follow the suggestions of his imagination to an extent attained by no other artist, and which was calculated to mislead or bewilder others brought under his influence, but destitute of his genius. He had numerous followers, whose works, for the most part mannered and exaggerated imitations of their master's style, are now forgotten. Contemporary artists of the 16th century were Jacopo Tatti, called Sansovino, of Venice, who had many eminent scholars; Pietro Torrigiano; Baccio Bandinelli, who restored the right arm of the Laocoön; Benvenuto Cellini, equally distinguished as a sculptor and as a worker in the precious metals; Guglielmo della Porta, famous for his admirable restorations to the Farnese Hercules; and Giovanni da Bologna, a Frenchman by birth, sculptor of the celebrated "Rape of the Sabines" and the bronze statue of Mercury at Florence; all of whom possessed great merit as sculptors, although their works are conceived after a lower ideal than those of the masters of the previous century, and are imitations of the antique. Profuse ornamentation, high finish, illusive effects, and a great elaboration of details engaged the attention of the artist, and nobility of form and force of expression were lost in vain attempts to represent anatomical impossibilities. Giovanni Lorenzo Bernini, born in Naples in 1598, affords an example of this perversion of the principles of the art, and his works, notwithstanding the fertility of imagination and the executive ability which they display, are deservedly considered to violate taste and propriety. Alessandro Algardi, Francesco Mocchi, and other sculptors of the 17th century, exhibited similar characteristics, although in occasional efforts they rose above the spirit of the age. Francesco di Quesnoy (originally Duquesnoy), called Il Fiammingo (the Fleming), deserves mention as an artist of purer taste, who excelled in portraying children. With the commencement of the 18th century sculpture in Italy had degenerated into a purely ornamental art, in which mechanical skill was more appreciated than taste or originality. In the latter half of the century the enlightened efforts of Popes Clement XIV. and Pius VI., and Cardinal Albani, the publications of Winckelmann, and the unearthing of the buried treasures of Pompeii and Herculaneum, had the effect of reviving a love for the antique; and with the appearance of Canova (1757-1822) succeeded an era of purer taste. Some of the early works of Canova

reflect the true antique spirit; but he subsequently cultivated a meretricious gracefulness of form, particularly in his female figures, with a frivolous and ignoble mannerism. Among the successors of Canova have been Tenerani, Fraccaroli, Bartolini, Finelli, Magni, and Vela, the sculptor of the well known statue of Napoleon dying at St. Helena. Their works are gracefully designed, though somewhat feeble and affected, and admirably finished. Giovanni Dupré of Siena (born 1817) rises above academical conventionality, and may be considered the leading sculptor of the time in religious subjects. His *Pietà* for the cemetery of the Misericordia in Siena is his most striking production. Bastianini of Fiesole (died 1868) was also a sculptor of remarkable promise.—The history of Italian sculpture may be considered to describe in general terms the progress of the art in modern times in other European nations. In all of them it probably received its impulse from Italian artists, followed almost similar phases of improvement and decline, was influenced by similar fashions, and has been so slightly modified by national habits or feelings as to render unnecessary any elaborate account of its progress out of Italy. The chief masterpieces of ancient and modern art are still to be found in that country, and thither it is still the custom for sculptors of other countries to resort. In France the earliest names of note are Germain Pilon and Jean Goujon, who flourished in the 16th century. The florid style of Giovanni da Bologna was subsequently followed with considerable success, and in the reign of Louis XIV. Girardon and Puget were the precursors of a long line of sculptors, among whom were Coysevox, Falconnet, celebrated for his equestrian statue of Peter the Great, Guillaume Coustou, sculptor of the famous "Horses of Marly" in the Champs Élysées of Paris, his brother Nicolas Coustou, Pigalle, Bouchardon, Houdon, noted for his fine portrait statue of Washington, Chaudet, and other artists of merit. In the first half of the present century flourished David d'Angers, a great and original artist, author of the sculptures on the pediment of the Pantheon in Paris; Barye, Bosio, Rude, Cortot, Pradier, Lemaire, Duret, Joffroy, Simart, Foyatier, and Préault. Contemporary French sculptors are Guillaume Perraud, Carpeaux, Crauk, Falguière, Gumery, Millet, and Dubois. Sculpture in Spain has since the 16th century been identical or nearly so with that of Italy, except that it has been more exclusively devoted to religious purposes, a practice which led to the manufacture of images of sacred personages colored to represent life and habited in real drapery. The thirty years' war and other disturbing causes checked the development of the art in Germany during the 17th century; and in the 18th we find few sculptors of note besides Andreas Schlüter, who produced the equestrian statue of the Great Elector in Berlin, and Donner.

Within the present century German sculptors have infused a certain amount of healthful realism into their monumental works and portrait statues. Rauch excelled in this particular, and his equestrian monument of Frederick the Great in Berlin is one of the finest works of its class executed in modern times. Other sculptors of note are Dannecker, Schadow, Drake, Schievelbein, Rietschel, Hähnel, Kiss, Schilling, Begas, and Schwanthaler, most of whom have followed a style partaking of the qualities of modern romantic art and of the antique. Denmark has produced in Thorwaldsen an artist who coöperated with Canova in bringing back the severity and simplicity of antique art, and who at the same time had no lack of religious feeling. Until the present century the art was pursued in England principally by foreigners, and the first native sculptor of note was Flaxman, a man of singularly pure ideal conceptions, whose works bear a striking affinity to the antique. His designs from Homer are in this respect among the most remarkable productions of modern art. Next in ability to him was Gibson, who passed a great part of his life in Rome, and cultivated the antique style with considerable success. Other British sculptors of repute are Chantrey, the two Westmacotts, Wyatt, Thomas, Watson, Lough, Macdowell, Bailey, Marshall, Weekes, Thornycroft, Bell, Woolner, and Foley. No sculptures worthy of the name were produced in the United States previous to the time of Greenough (1805-'52), but within the past half century the art has been followed with various degrees of success by a considerable number of Americans. The most promising of these was Thomas Crawford, whose equestrian monument to Washington in Richmond, Va., possesses more than ordinary merit. Powers, for many years a resident of Florence, acquired a reputation by his "Greek Slave;" and Story, Randolph Rogers, and Ward are contemporary sculptors of ability. Besides these may be mentioned Palmer, Brown, Ball, Clevenger, Akers, Bartholomew, Harriet Hosmer, Hart, Rinehart, and Launt Thompson. John Rogers is noted as a successful designer of statuette groups. The sculptured remains of Central and South America, like those of eastern Asia and India, are chiefly of value to the archæologist, and do not illustrate the progress of the art. They are distinguished by vastness of scale and a certain grotesque fancy, and in some instances by a beauty and symmetry of form remarkable in a semi-civilized people.—The most comprehensive work on the history of sculpture is Schnaase's *Geschichte der bildenden Künste* (7 vols., Düsseldorf, 1843-'64; 2d ed. by Lüt-zow and Friederichs, 1866-'75), still unfinished. See also Vasari, "Lives of the most eminent Painters, Sculptors, and Architects" (English translation by Mrs. Jonathan Foster, 5 vols. 8vo, London, 1850-'53); Flaxman, "Lectures on Sculpture," with 52 plates (London, 1829);

Lübke, *Geschichte der Plastik*, with 231 woodcuts (Leipsic, 1863; 2d ed., 1870; English translation by Mrs. Bunnett, 2 vols., London, 1872); Westmacott, "Handbook of Sculpture" (Edinburgh, 1864); Perkins, "Tuscan Sculptors" (2 vols., London, 1864); Tuckerman, "Book of the Artists" (New York, 1867); and Viardot, *Merveilles de la sculpture* (Paris, 1872).

SCUPPAUG, a spiny-rayed fish of the family *sparidae* and genus *pagrus* (Cuv.); it is also called scup and porgy in some localities. In this family the gill covers are shining and scaly, and unarmed; the palate without teeth and the jaws not protractile; the spinous rays of the dorsal and anal fins bare, and received when depressed in grooves at their base; pectorals and ventrals sharp-pointed; branchiostegal rays six; the scales large and thin, broader than long, the centre of growth being near the posterior border. In *pagrus* the molars are rounded and in two rows, and the front teeth conical with a villiform card-like band behind them. There are more than a dozen species in



Scuppaug or Porgy (*Pagrus argyrops*).

the Mediterranean and Red seas, and the East Indian and S. Pacific archipelagos. The common species on the American coast (*P. argyrops*, Cuv.) attains a length of 8 to 12 in.; when first taken from the water it is pinkish or flesh-colored above and silvery below; about the eyes reddish; a narrow green ridge at the base of the dorsal, and one just back of the eyes; iris mostly silvery; dorsal reddish, with the anterior rays silvery; the body is much compressed toward the back, which is high; the lips large and loose; caudal deeply forked; there is a large purple scale at the beginning of the lateral line. The food consists of cuttle fish, crustaceans, mollusks, and sea weeds. It is found from Massachusetts to South Carolina, and is largely used as food in a fresh state. The *P. vulgaris* (Cuv.) of the Mediterranean is about the same size, silvery, with reddish tinges or bars on the back; its flesh is highly esteemed; it was known as the *phagros* by Aristotle, and was placed in the old genus *sparus* (Linn.) until separated by Cuvier; it is not found in northern waters.

SCURVY, or *Scorbutus*, a disease depending upon insufficient and faulty nourishment, which was known to the ancients, but has been more common since long sea voyages have been undertaken. Sea scurvy depends on an impoverished condition of the blood, in which the albumen becomes less easily coagulable and the fibrine less coherent. The most marked symptoms are swollen gums, pale and bloated complexion, lassitude, lowness of spirits, extreme debility, and a tendency to hæmorrhages, which may take place from the intestines, under the skin, or among deeper-seated structures, even beneath the periosteum. Ulceration, sloughing, separation of epiphyses, disuniting of old fractures, and intercurrent diseases of a low type, may be observed. The scorbutic taint, when not manifest as a distinct disease, sometimes complicates other affections. Sea scurvy was formerly the scourge of a seafaring life. In 1593 Admiral Hawkins said that, within his experience, as many as 10,000 seamen had died of scurvy. Lord Anson, in his voyage round the world, at a much later period, lost more than four fifths of his men; and when he arrived at Juan Fernandez, of the 200 men then surviving, only eight were capable of duty. The whole crew of the Spanish ship *Oriflamme* perished in this manner, and the vessel was discovered floating at the mercy of the winds, with the dead bodies on board. Though principally occurring during long sea voyages, it has been seen, in very destructive forms, in besieged cities, camps, prisons, and even among a destitute rural population. Dr. Joseph Jones, a confederate surgeon, estimates that nine tenths of the great mortality in the Andersonville prison was due directly or indirectly to scurvy.—Many causes, such as depressing mental emotions, fatigue, exposure to cold and wet, neglect of ventilation and cleanliness, and insufficient food, undoubtedly contribute to the production of scurvy; but its essential cause is a deficiency of some important constituent of the food. It has not been determined with chemical accuracy what the missing constituent is, though it has undoubtedly a near connection with some of the organic acids, namely, tartaric, acetic, citric, malic, and lactic. But the class of aliments which furnish the substances needed are well known, and there are few diseases which can be more completely cured, or still better prevented, by judicious hygienic management. The aliments which have this power are mostly vegetable, though fresh meat and milk have been found to play an important part in some cases. Salt meat is not a cause of scurvy, except as excluding more nourishing and digestible food. The efficacy of lemon juice as an antiscorbutic seems to have been known in 1609, but it was not till 1795 that, by order of the admiralty, it was regularly supplied to the British navy. Since that time the amount of scurvy has vastly diminished. The lemon juice should be pure, should have 10 per cent. of

brandy or rum added to prevent fermentation, and should be packed in jars, covered with a layer of oil, and sealed. Nearly all esculent vegetables, especially raw and unripe, before the acids have given place to sugar and jelly, are antiscorbutics. Potatoes are among the best. Cabbage, in the form of sour crout, in which acetic acid has been developed, water cress, and onions rank next. Gooseberries and tamarinds are useful; and a decoction of the leaves and bark of a tree, supposed to have been a spruce fir, restored to health the crew of Jacques Cartier in 1535-'6. Several other vegetables are likely to be useful in an emergency, such as sorrel (*Rumex acetosella*), lamb's quarter (*Chenopodium album*), wild artichoke, the American aloe (*Agave Americana*), indigenous in Texas, California, and Mexico, the prickly pear, and the dandelion. Desiccated vegetables may be used, but are less efficient as well as less agreeable than the fresh. Dr. Parkes recommends the issue of vinegar with the daily rations, in addition to the lemon juice, and also the citrates, tartrates, lactates, and malates of potash in bulk, to be used as drinks or added to the food.

SCURVY GRASS, a plant of the mustard family, so called originally on account of its supposed antiscorbutic properties, *Cochlearia officinalis* (Lat. *cochlear*, a spoon, from the shape of the leaves), found on the seacoast of Great Britain and all around the Arctic circle. It is a low, smooth annual or biennial, with a rosette of heart-shaped root leaves; flower stalks 6 to 12 in. high, with numerous small white flowers. The odor of the leaves when bruised is unpleasant, and the taste acrid and bitter; it is sometimes eaten as a salad, but more from some



Scurvy Grass (*Cochlearia officinalis*).

supposed medicinal effect than for its palatableness. It is sometimes cultivated in Europe.—The plant called scurvy grass in Pennsylvania and southward is a native of this country as well as of Europe, where it is known as winter cress, *Barbarea vulgaris*; it is common

in low grounds, has dark green leaves, and produces its yellow flowers in early spring. A small variety of it (formerly called *B. præcox*) is sometimes cultivated, and is sold in the markets as water cress, to which it is much inferior in flavor.

SCUTARI. **I.** A town (Turk. *Uskudar*; anc. *Chrysopolis*) of Asiatic Turkey, on the Bosphorus, opposite Constantinople and the largest suburb of that city; pop. about 70,000. It is built on several hills, and has an imperial palace, eight mosques, a convent of howling dervishes, celebrated Turkish burial grounds, and an English cemetery, where about 8,000 soldiers are buried, and which contains a large obelisk by Marochetti with an inscription in several languages. Near the cemetery are barracks, in the building which during the Crimean war was used as a hospital, celebrated through Florence Nightingale's labors. Scutari is a great centre of traffic between the capital and the Asiatic provinces. **II.** A fortified town (Albanian, *Skodra*; Turk. *Iskenderieh*) of European Turkey, in N. Albania, on the river Boyana, at the S. E. extremity of the lake of Scutari, 15 m. from the Adriatic coast; pop. about 25,000. It is the see of a Greek bishop. About half the population are Catholics under the united archbishopric of Antivari and Scutari, the rest being Greeks and Mohammedans. It has manufactures of cotton goods and firearms, and ship yards, and considerable trade is carried on. On an adjacent lofty hill is a citadel.—The lake of Scutari or Zanta (anc. *Labeatis*), on the S. W. border of Montenegro, is about 18 m. long from N. W. to S. E. and 6 m. wide. It contains small islands, receives most of the streams of Montenegro, the principal being the Moratcha, and communicates with the sea by the river Boyana. It abounds with fish, especially of the carp family.

SCUTIBRANCHIATES, an order of gasteropod mollusks, so named by Cuvier because the gills or branchiæ are protected by a *scutum* or shield, as in the *haliotidæ* or ear shells.

SCYLLA. See **SCIGLIO**.

SCYTHE, and **Sickle**, long knives with a curved edge, the former commonly used for mowing grass, bushes, &c., and the latter, called also a reaping hook, for cutting grain. These implements in ancient times were also employed as weapons. In ancient Roman cameos they are depicted in the various forms in which they were employed under the general name of *falsæ*; as the *falsæ messoria*, the crooked sickle, still used for reaping grain; *falsæ fenaria*, the long scythe for mowing grass, constructed with a handle at right angles to the blade, very much as at present; *falsæ vinatoria*, *arboraria*, *silvatica*, &c., the pruning knife, bill hook, bush scythe, &c. The implement was a symbol of Saturn, the *senex falcifer*, personifying time, who cuts down and destroys all things as with a scythe. As a weapon the scythe was also made in several forms. The

sword with the curved edge was the *falcatus ensis*; and in the shape of a short hooked knife, the handle terminating beyond in a dagger, it was made of convenient use for one hand, or attached to the end of a pole. In another form, which was used by the Assyrians, Medes, Persians, Gauls, and Britons, the long crooked scythe blades were fastened to the axles of their chariots or to the fellos of the wheels, and were thus made to cut down those among whom the chariots were driven. In modern warfare scythes have been used in close combat, and make a formidable weapon.—As agricultural instruments, there was little difference in the forms of the ancient scythes and sickles from those of the present time, and they appear from the representations of them to have been as well adapted for their uses as any made up to the 17th century. The same forms appear in the illustrations of Strutt in his "Manners and Customs of the People of England," and were there in use more than ten centuries ago; but the snath or handle was straight, and was furnished with only one short holding piece. Among the earliest recorded improvements is the stiffening of the back edge by welding to it a strip of iron. This was also one of the earliest American mechanical inventions, being made by Joseph Jenks, who established iron works in 1646 on the Saugus river in Lynn, Mass., and in May, 1655, received from the legislature a special grant or patent running seven years for this improvement. In the notices of early iron works in New England, scythes are generally named among the most important products. Among the manufacturers especially noted for this and similar productions was Hugh Orr, a Scotchman, who emigrated to Bridgewater, Mass., in 1738. His son Robert Orr established the present mode of forging scythes with the trip hammer. The business has since been largely conducted in Sutton, Worcester co., and also in several towns in Maine and New York; but it is gradually disappearing before the introduction of mowing and reaping machines. In England the manufacture has been important for the last 300 years, and has been particularly successful in the N. extremity of Derbyshire, extending about 6 m. S. from Sheffield. It was established there by a party of Flemings who were driven from the Netherlands, the scythe makers among them settling in the parish of Norton and the sickle makers in the adjoining one of Eckington. The best of these tools are still made in this neighborhood, and in Bristol and Dudley.—Scythes for cutting grain, having a framework of wooden bars parallel with the blade for laying the grain straight, are called cradles.

SCYTHIA, in ancient geography, a vast area, of indeterminate boundaries, in eastern Europe and western Asia. Its native population, according to Herodotus, called themselves Scythi. The name Scythians is found in a verse of Hesiod, as given by Strabo, but it appears

from internal evidence that it is an interpolation, or a correction of some copyist. Homer speaks of races who were "milkers of mares and cheese-eaters," which description agrees with what Hesiod says of the people he mentions. Herodotus describes Scythia as a square area, extending 4,000 stadia (nearly 500 m.) on every side, the southern boundary being the coast from the mouth of the Danube (not including the Tauric Chersonesus) to the sea of Azov (Niebuhr), or to the mouth of the Don (Rawlinson). Scythia, as described by him, probably comprehended the whole territory from the E. Carpathians to the lower Don. On the north were the nations called Agathyrsi, Neuri, Androphagi (cannibals), and Melanchlæni (black-coats). The Sarmatians, a Scythic tribe, subsequently gained the ascendancy, and their name was thereupon given to the territory comprised in the Scythia of Herodotus. (See **SARMATIA**.) Afterward the Greeks applied the name to the Asiatic region N. of the Oxus and Jaxartes, from the Caspian to the confines of China, and divided it by the northern Imaus range (the Thian-shan) into Scythia intra Imaum and Scythia extra Imaum.—Herodotus visited the Greek settlements on the northern shores of the Euxine, and describes the Scythians as nomadic tribes, living on animal food, keeping large troops of horses, and excelling in horsemanship and archery. Hippocrates describes them as gross and fleshy, with loose and yielding joints, and little hair. It was customary for a Scythian to drink the blood of the first man he slew in battle, and to preserve as trophies the scalps and skins of the enemies he overthrew. They entombed their kings amid sacrifices of men and beasts, and put great faith in soothsaying and magic arts. They were the successors of the Cimmerians in the order of migration westward, and invaded the Median empire near the close of the 7th century B. C. (See **MEDIA**.) Cyrus is said to have fallen in a battle against the Scythian Massagetæ in Asia, and Darius I., who led a vast expedition against the Scythians in Europe through Thrace, was compelled to retreat with severe loss. The Parthians too are believed to have been of Scythic descent. The hordes which about 200 B. C. came from the western confines of China and overran parts of Turkistan and modern Persia, were also Scythians; they turned toward India, and a portion of them founded a settlement known as Indo-Scythia. The names of the principal tribes engaged in the Scythian incursions, as far as they have come down to us, are Sacæ (often used in a wide sense, and sometimes applied to the Scythians in general), Massagetæ, Dahæ, Tochari, Asii or Asiani, and Sacarauli.—Some scholars maintain that the Scythians were Turanians, others that they were Indo-Europeans; Rawlinson thinks that the Greeks and Romans applied the name to any nomad race, whether Indo-Europeans or Turanians.—For the family of languages to which many phi-

logists apply the term Scythic, see **TURANIAN RACES AND LANGUAGES**.

SCYTHOPOLIS, an ancient town of Palestine, about 12 m. S. of the sea of Galilee, and 4 m. W. of the Jordan. The village now occupying its site is called Beisan, preserving its Scriptural name Bethshean or Bethsan. It is supposed that its classical name was given it after the invasion of the Scythians, because a large number of Scythians had permanently settled in it. The Philistines fastened the corpses of Saul and his sons to the walls of Bethshan, which, though belonging to Manasseh, was never really a Jewish city. Scythopolis was one of the cities of the decapolis. Pompey devastated it, Gabinius rebuilt it, and Saladin burned it. Ruins of temples, a theatre, and walls are scattered over the neighborhood of the present village.

SEA. See **OCEAN**.

SEA ANEMONE. See **ACTINIA**.

SEA BEAR. See **SEAL**.

SEABURY. **I. Samuel**, an American clergyman, born in Groton, Conn., Nov. 30, 1729, died Feb. 25, 1796. He graduated at Yale college in 1748, studied medicine in Scotland, and then theology, and was ordained in London in 1753. He became rector of Christ's church, New Brunswick, N. J., in 1757 of Grace church, Jamaica, Long Island, and in 1766 of St. Peter's, West Chester, N. Y. During most of the war of the revolution he resided in the city of New York, being a royalist. He was consecrated bishop of Connecticut at Aberdeen, Nov. 14, 1784, and was chosen rector of St. James's church, New London. He took part in revising the prayer book and framing the constitution of the church which was adopted in 1789. Three volumes of his sermons were published in 1791-'8. **II. Samuel**, an American clergyman, grandson of the preceding, born in New London, Conn., June 9, 1801, died in New York, Oct. 10, 1872. He was ordained deacon in the Protestant Episcopal church, April 12, 1826, and priest in July, 1827. He was a missionary for a time at Huntington and Oyster Bay, Long Island, whence he removed to Hallet's Cove (now Astoria). In 1831 he removed to New York, and for 18 years was editor of "The Churchman," and from 1838 to 1868 he was rector of the church of the Annunciation. He was chosen professor of Biblical learning in the Episcopal general theological seminary in June, 1862. He published "The Continuity of the Church of England in the Sixteenth Century" (1853); "Discourses on the Supremacy and Obligation of Conscience" (1860); "American Slavery Justified" (1861); and "The Theory and Use of the Church Calendar" (1872). After his death appeared "Discourses Illustrative of the Nature and Work of the Holy Spirit, and other Papers," edited by his son (1874).

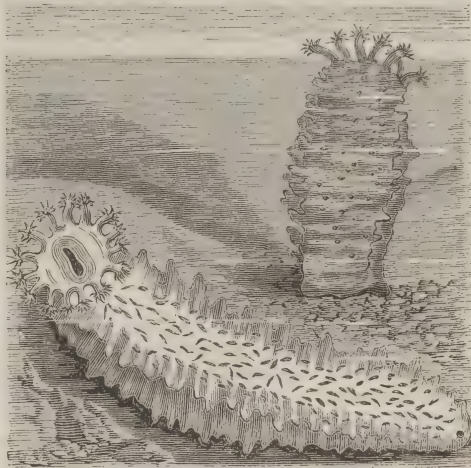
SEA CAT, the common name of the cartilaginous fishes of the order *holocephala* and family *chimæroidæ*. They seem to form a group intermediate between the sturgeons and sharks;

the dorsal cord is continuous, with cartilaginous neural arches and transverse processes; the skull is short and rounded, produced on each side into a process to which the lower jaw is connected instead of to an *os quadratum*; the upper jaw and palate are fused with the skull, without traces of suture; the upper jaw has four broad plates or teeth, and the lower two; the eyes very large and without lids; nasal cavities very large and convoluted, opening on the under side of the snout in front of the mouth, which is small; the branchiæ are not fixed by their outer margin, and are covered by a small operculum, adhering to the hyoid arch, with only a single aperture on each side behind the head, communicating interiorly with five branchial sacs opening separately into the pharynx; there is no air bladder, and the intestine has a spiral valve. The skin is covered with placoid granules; between the eyes is a fleshy club-shaped process, with serrated edge and ending in a spine, which somewhat resembles a crown, and has given rise to one of its popular names, "the king of the herrings." The ventrals are abdominal, the anal small, the pectorals powerful, and the tail heterocercal; the anterior dorsal is short, triangular, with a strong spine for the first ray, and is placed over the pectorals. They are oviparous, the large eggs being enclosed in a leathery capsule; the males have trifold claspers.—The northern sea cat (*chimæra monstrosa*, Linn.) has a conical snout, the dorsals contiguous and reaching to the end of the tail, which is prolonged into a slender filament; the body is elongated and shark-like; the eyes have a greenish pupil surrounded by a white iris, and they shine, especially at night, like cats' eyes, whence the common name; the color is silvery with brown spots; the tail is nearly as long as the body. It attains a length of 3 or 4 ft., and is found in the North sea and northern Atlantic, where it pursues the shoals of herring and other mi-

wounds.—In the southern sea cat (*callorhynchus australis*, Gronov.) the snout ends in a gristly appendage, bent backward at the end so as to resemble a hoe; the anterior dorsal is very far forward over the pectorals, the second over the ventrals and reaching to the caudal, and the tail does not end in a filament. It is of about the same size as the northern animal, and silvery, tinged with yellowish brown.

SEA COW. See MANATEE.

SEA CUCUMBER, one of the popular names of the *holothuria*, the highest order of the echinoderms, which are the highest class of ra-



Sea Cucumber (*Holothuria lutea*).

diated animals; the name is derived from their generally elongated and more or less cylindrical and warty form; they are also called sea slugs from their vermicular mode of creeping. The body is rather soft, with a leathery skin sometimes furnished with calcareous plates or granules without spines; the mouth is at one end and the cloacal opening at the other, the former surrounded by branching and retractile tentacles supported on an osseous ring which forms the rudiment of an internal skeleton; the ambulacra (feet) or suckers are arranged usually in longitudinal rows on the sides of the body, alternating with spaces having no such apparatus, and corresponding to the spiny rows of star fishes and sea urchins; motion is effected principally by these suckers, the mouth forward. By the introduction or ejection of water at the posterior extremity the body may be made to assume great variations in length and width, and the general appearance externally is more that of an annelid than a radiate. Some of the genera (as *synapta*) have cutaneous anchor-like hooks by which they attach themselves, each inserted obliquely under a small subcutaneous scale perforated by a canal. The muscular layer under the skin is very thick, and so powerful in its constrictions that the animal can discharge all its viscera through the



Northern Sea Cat (*Chimæra monstrosa*).

gratory fish; it also feeds on jelly fishes and crustaceans. The flesh is tough, but the Norwegians use the eggs as food, and employ the oil of the liver in diseases of the eyes and for

mouth. They have a well developed œsophageal ring, which sends off nerves to the body and tentacles; the intestinal canal is very long, retained in place by a kind of membranous



Synapta Duvernœi.

mesentery, and generally unsymmetrical; they have a distinct vascular system, but no heart; the tubes for the water for respiration are much branched, and open from the cloaca; respiration is also effected partly by the tentacles around the mouth, which communicate with the aquiferous system, and by the water introduced into the visceral cavity. The feet are either in five rows as on the ribs of a melon, or only on the lower surface, or on a kind of ventral disk; their motions at the bottom of the sea are aided also by the oral prehensile tentacles. The quinary system prevails among holothurians as among other echinoderms. The sexes are distinct; some multiply by fissuration, but most by means of eggs; in the first form the young has an oval ciliated body, like an infusorial animalcule, without external organs or distinction of parts; in the next larval change the organs are developed, at first in a bilateral manner (according to Müller), and then pass into the radiated type by a process of internal gemmation, receiving new locomotive organs in the ciliated fringe as they pass into the pupa form, from which the true echinoderm is developed.—The old genus *holothuria* (Linn.) has been variously subdivided. They are generally small on the New England coast, but attain a large size in the bay of Fundy and on the banks of Newfoundland; on the mud flats of the Florida reefs they are sometimes seen more than a foot long and 3 or 4 in. in circumference. All along the American coast is found the *sclerodactyla Briareus* (Ayres), from 3 to 6 in. long, dark brown, with 10 very branching tentacles; it lives on muddy bottoms in shallow water among the roots of *zosteræ*. The *Cuvieria Fabricii* (Dub. and Kor.;

H. squamata, Fabr.) is about 3 in. long, and bright brick-red, the color being readily imparted to alcohol and even to water; it is scaled and granulated above, and has 10 tentacles; it is generally caught on hooks, and occurs on the coast of New England. The *chirodota arenata* (Gould) is 5 to 6 in. long, club-shaped, ending posteriorly in a tube about the size of a crow quill; the color is light drab, with calcareous granules; it is found on our beaches after storms, and lives in shallow water. The *botryodactyla grandis* (Ayres) is very abundant in the bay of Fundy and on the banks of Newfoundland, and attains a length of 6 to 8 in.; when boiled it is very palatable. From researches made on the American coast it appears that the laminarian zone just below low-water mark is the favorite residence of holothurians, though a few occur in deep water. Those found in shallow water are the most common. The sea urchins live in deeper water, and the star fishes are the lowest both in habitat and in the radiated scale. The breeding season here seems to be the winter and spring. For a description of the 8 genera and 13 species of the American coast, all of which are different from those of Europe, see "Proceedings of the Boston Society of Natural History," vol. iv. (1851-'2), where Dr. W. O. Ayres has carefully compared them.—Among the European species are the *H. (psolus) phantapus* (Linn.), with an almost scaly envelope, and the feet of its central disk arranged in three series; the *H. squamata* (Fabr.), a small species, with the lower surface flat and soft with a great number of feet, and rough and scaly above; and the *H. tremula* (Gmel.), of the Mediterranean, blackish, bristled above, with numerous feet below, and 20 branched tentacles, which grows to a foot in length, and is one of the species eaten by the Italian fishermen. Several species of holothurians are collected in the East Indies for food, under the name of *biche de mer* or *tripang*, the taking and preparation of which employ great numbers of the Malays and Polynesians; the best are found on reefs of mixed coral and sand in the Feejee group in one or two fathoms of water, and are obtained by diving. They are boiled in their own liquid, then dried on stages in large heated houses, and meet with a ready sale at high prices in the Chinese markets as ingredients for rich soups. For an account of the mode of preparation, see vol. iii. of the "Narrative of the United States Exploring Expedition," under Capt. Wilkes, pp. 218-222, with a plate. Dr. Karl Semper has described and figured in great detail the holothurians of the Philippine islands in his *Reisen im Archipel der Philippinen* (3 vols., Leipsic, 1867-'72). See also Wallace's "Malay Archipelago" (1869).

SEA DEVIL. See GOOSE FISH.

SEA DOVE. See AUK.

SEA EGG. See ECHINUS.

SEA ELEPHANT. See SEAL.

SEA FAN, a name popularly given to the alcyonarian polyps of the family *gorgonidae*, from their minutely branched and fan-like appearance. They are composed of a horn-like internal central axis, having sometimes in its sub-



Sea Fan.

stance a little carbonate of lime, but never enough to give them a coral-like rigidity. The external covering is gelatinous, tenacious, and sometimes almost fleshy, secreted by numerous cylindrical, short, laterally connected polyps. The branches rise irregularly, and are joined together by a network. They live in all seas and in deep water; several species, 4 or 5 in. high, are found on the New England coast, but in the tropics they attain a height of 2 or 3 ft. The sea fan of the West Indies (*gorgonia flabellum*, Linn.) attains a height and width of 2 ft.; it is reddish or yellowish, of delicate texture and branching form.

SEA FOX. See SHARK.

SEA HOG. See PORPOISE.

SEA HORSE. I. See WALRUS. II. An osseous fish of the order lophobranchs (with tufted gills), of the family of pipe fishes, and of the genus *hippocampus* (Cuv.). The ordinal and family characters have been described in the articles LOPHOBRANCHS and PIPE FISH. In the present genus, which includes several species, the snout is prolonged and the head elevated posteriorly, somewhat resembling a miniature horse's head, the ears being represented by a spiny coronet on the occiput; the orbits, pectoral ring, and the other rings of the mailed body are more or less spiny; the tail is without a fin and prehensile, and by means of it they suspend themselves to sea weeds and other submarine objects; the eyes are prominent, and can be moved independently of each other, and in opposite directions; the pouch in which the males carry the eggs till they are hatched opens at the commencement of the tail; the ventrals are absent, and the pectorals very small and just behind the head; there is a single short dorsal on the middle of the back,

whose edge has a spiral motion; the females have a small anal; the mouth is terminal and without teeth. They inhabit all parts of the temperate and especially of the tropical oceans; the food consists of minute marine animals, especially ova; a kind of hibernation has been observed in the Mediterranean species by Rusconi; they swim vertically, with the tail ready to wind around any object they meet. There is one species in the British seas, the *H. brevirostris* (Cuv.), 6 in. or more in length, with much compressed, short, and deep body, divided by longitudinal and transverse ridges, with tubercles at the line of intersection; the snout is comparatively short; the color is pale ashy brown, with iridescent tints about the head. De Kay describes the *H. Hudsonius*, 3 to 6 in. long, from the coast of S. New Eng-

Sea Horse (*Hippocampus brevirostris*).

land and New York; it is yellowish brown, with 12 rings in the body and 36 in the tail. Other species are found in the Mediterranean, and more abundantly in the East Indies.

SEA KALE, a cruciferous plant, *crambe maritima* (Gr. κράμβη, a kind of cabbage), which grows upon the western coasts of Europe and on the Baltic and Black seas, and has long been cultivated in European gardens. Sea kale is a perennial with a long fleshy root; the root leaves are roundish, 6 to 12 in. across, thick, wavy, and often lobed on the margin, and of a peculiar grayish green; the flower stalk is 2 to 4 ft. high, branching, and bears loose panicles of white flowers which have a strong odor of honey; the pod, about the size and shape of a cherry stone, contains but one seed. The wild plant has long been used as a pot herb, and was eaten by the ancient Romans; its cultivation in England dates back a little more than 100 years; it is now held in high esteem there, and is cultivated for market. In this country it is almost unknown, even in private gardens. Those who live upon the shores

where it grows wild cook the leaf stalks and midribs of the leaves, after peeling them; but when cultivated it is so managed that the buds as they push shall be blanched, and the edible portion is the tender, undeveloped leaves. The plant is raised from seeds, the seedlings remaining a year in the seed bed, or from cuttings, 2 to 4 in. long, of the roots of old plants, started in spring on a hotbed. Either year-old seedlings or plants from cuttings are set out in well enriched soil, 2 ft. apart, and the rows 3 ft. distant. On the approach of winter the plants are covered with 8 or 10 in. of sand or leaf mould, so that the shoots in forcing their way up through this in spring will be blanched and tender; when the tip of the shoot reaches the surface the blanching material is drawn away and the shoot cut at its junction with the



Sea Kale (*Crambe maritima*). Blanched Young Shoots.

root. In England, one method of blanching is to use pots or cylinders of earthenware, taller in proportion than flower pots, or wooden boxes. By surrounding the pots with fermenting manure the plant may be forced.

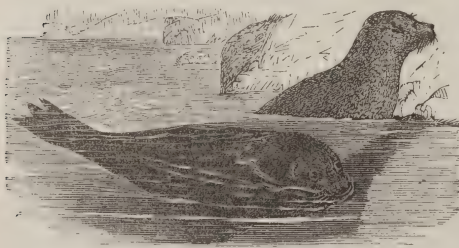
SEAL (Ang. Sax. *seol*), an aquatic carnivorous mammal, the type of the family *phocidae*, constituting the old genus *phoca* (Linn.), which has been variously subdivided. The group of seals is at once distinguishable from other mammals by the structure and arrangement of the limbs; the toes of all the feet are included almost to the end in a common integument, converting them into broad fins, the bones being to a great extent within the skin of the trunk, and the tips armed with strong non-retractile claws; the hind feet are thrown out backward, nearly horizontally, the very short tail being between them, and are the principal agents in swimming and diving; the fore paws when swimming are applied close to the body, and are used only in turning about. The body is cylindrical, tapering gradually backward; the head is small and rounded, and the neck short; the skin has an under woolly down, over which is a covering of long, smooth, and shining hairs, shedding water by an oily secretion, and offering no resistance in swimming; between the

skin and muscles is a layer of fat, as in cetaceans, giving that plumpness to the body expressed in the common saying "as fat as a seal." The skull is thin, which renders the head light in the water, in the smaller species without the crests for muscular origins usually seen in carnivora; the face short and broad; zygomatic arches perfect and strong; anterior nasal opening not terminal, and in some directed almost vertically for facilitating respiration when the animal comes to the surface; the tentorium separating the cerebrum and cerebellum is formed wholly from the occipital bone; the orbits are continuous with the temporal fossæ, and the skull is very narrow between them, the cranial cavity seeming like a box shut off from the facial portion of the head; the lower part of the occipital bone is broad and thin, with an oval opening in the young in front of the great foramen covered with membrane, but closed by bone in the adults, and the condyles are much larger than in other carnivora; the infraorbital foramina are very large, for the exit of the branch of the fifth pair of nerves, which supplies the sensitive whiskers; the nasal bones are very short. The incisor teeth are small and pointed, the canines not generally very projecting, but much worn, and the molars with laterally compressed crowns, sharp cutting edges, many-pointed, and usually single-rooted; the number varies in the different genera. The cervical vertebræ are short, the dorsals and pairs of ribs 15, and the lumbar 5 (in the common seal), the caudals very imperfectly developed, the anterior portion of the sternum prolonged far up the neck and movable, the scapula small with a moderate and nearly central spine, and the coracoid and clavicles absent; the bones of the forearm short, wide, and flattened; the femur at a right angle with the spine and the leg, very short and comparatively immovable, giving greater freedom of motion to the rest of the limb; tibia and fibula long and flat, the former with a double curvature; metatarsal bones and toes long and slender, and the foot wide and paddle-like. The mouth has thick fleshy lips, with many long, knotted, and exceedingly sensitive bristly whiskers with nerves from the fifth pair; the tongue rough and bifurcated at the end; nostrils capable of being completely closed under water; external ears in most merely small valves which close the auditory opening; the eyes (with nictitating membrane) large, full, bright, and expressive of great intelligence; brain large, and with many convolutions; mammae two or four, ventral, near the umbilicus, enclosed in folds of the skin; the intestinal canal is very long for a carnivorous animal; the posterior vena cava, close to the liver, has a large sac or sinus which receives five hepatic veins, serving to retain a portion of the blood from the heart while the animal is under water; the *foramen ovale* in the heart and the *ductus arteriosus* are often found pervious; the stomach is elongated, and has a vil-

lous coat; the right lung is two-lobed, and the left undivided; the kidneys are divided each into 120 to 140 parts like a bunch of grapes; the testes are permanently retained within the abdomen. The crystalline lens is more spherical than in land animals, and the sclerotic very thick in front and behind, and thin in the middle, allowing a change of its antero-posterior diameter by compression of the muscles to suit aquatic and aerial vision; the tapetum is remarkably brilliant. They live in the arctic and antarctic seas, near the coasts, and often at the mouth of rivers, preying upon migratory and other fish, crustaceans, and cephalopod mollusks. They are gregarious and migratory, fond of particular spots, leaving the coldest arctic regions in winter for milder seas; the herds are usually of the same species, or when different each species keeps by itself, rarely fighting with the others. Most are polygamous, each male having three or four females, forming small families; gestation lasts nine or ten months, and one or two young are born at a time, which are tenderly cared for; parturition and lactation occupy two or three months, in autumn, winter, or spring, which are passed on shore, the food being such as can be picked up on land or near the coasts, even from the vegetable kingdom; both sexes at this time grow very lean. They are fond of crawling out of water upon rocks, beaches, and ice floes, for the purpose of basking in the sun, always keeping a good lookout, and plunging into the water at the approach of an enemy; they never go far from their favorite element. They are playful, but at times fight fiercely, as in the breeding season; their bite is severe, and the wounds made by their teeth are not disposed to heal readily either on their own or the human body; some of the larger species are very powerful. The voice is a kind of snapping bark, which, with their canine expression of face, has given them the name of sea dogs. They can remain under water 20 minutes or longer; their animal heat is among the highest found in mammals. They swim with considerable speed, and are most expert divers; their movements on land are awkward and laborious, consisting of a series of short jerking leaps forward by means of the powerful muscles of the back, assisting themselves occasionally, as in climbing rocks and ice, by the anterior limbs; they can advance more rapidly on the ice, by a vertical motion of the spine, somewhat in the manner of a caterpillar, rendered possible by the short spinous processes, large and elastic intervertebral cartilages, and the uncommonly strong spinal muscles. The senses of smell and sight are very acute. They are easily tamed, affectionate, and docile; at zoological gardens they are taught to sit erect, to bow, kiss the hand, pretend to be asleep and to snore, turn the crank of an organ, shoulder a gun, shake hands, and perform other similar simple tricks; in captivity they are much disposed to be drowsy and almost

lethargic. Few animals are more tenacious of life than seals, and the most needless cruelties used to be practised in their capture; now the larger species are generally killed at once with the lance thrust into the heart, and the smaller ones are stunned by a blow on the nose from a long-handled hammer, with a sharp spike on the opposite side to hook into the skull. The Esquimaux hunt them in light boats with lances, or spear them at holes in the ice where they come up to breathe; to them the seal supplies food, oil for light and warmth, skins for clothes, boots, utensils, tents, and boats, sinews for thread and lines, and membranes for under garments and window coverings. The oil is of superior quality, and, if prepared from the fresh animals, is transparent, free from odor, and not unpleasant to the taste; the skin, by a peculiar process of Esquimaux tanning, makes a water-proof leather.—As articles of commerce seal skins are of two kinds, hair skins and fur skins; the former are used for making garments, the latter, now chiefly from Alaska, for finer purposes; all seal skins, however, have a mixture of coarse hairs and finer fur. Millions of skins have been used in Europe and in this country, and thousands of tons of shipping are employed in their capture. Large herds of seals of various species, especially the Greenland and hooded seals, are found on fields of floating ice, called seal meadows; on these the hunters try to surprise them when sleeping, killing the young with clubs and shooting the resisting adults. The seal fishery is extensively carried on from Newfoundland, in sailing vessels of from 50 to 200 tons burden, each manned by from 25 to 90 men; recently steamers have also been employed, ranging from 175 to 450 tons, with from 100 to 200 men each. The seals are taken on the ice off the E. and N. coasts of the island; the season lasts from the first of March to the close of May. The principal species taken are the harp and hooded seals, chiefly the former; two other varieties are also taken in Newfoundland, the square-flipper seal, a large species, and the dotard or native seal, which never leaves the island; the skins of the latter are more valuable than those of the other species, being spotted, and are much used for trunk covers, coats, gloves, &c. The fishery was not prosecuted by Newfoundlanders prior to 1763; in 1787 4,900 seals were taken from the ice, and the oil extracted; in 1871 there were 201 sailing vessels and 13 steamers employed, with an aggregate crew of 9,791 men; the number of steamers is increasing. The exports of seal skins from Newfoundland between 1838 and 1848 varied from 400,000 to nearly 700,000 annually; for the exports of oil and skins from 1868 to 1872 inclusive, see FISHERIES, vol. vii., p. 234. (See also NEWFOUNDLAND.) Many seals are taken in early spring at the Magdalen islands and on the Labrador coast among the floating ice, and also by nets set across narrow channels. Be-

sides man, the seal has to guard against bears on land and on the ice, and against sharks and carnivorous cetaceans in the water.—In the genus *phoca*, as restricted by modern naturalists, the dental formula is: incisors $\frac{1}{2}$, canines $\frac{1}{2}$, and molars $\frac{2}{1}-\frac{2}{1}=32$; the molars have three or four triangular cusps, all except the first with double roots, and placed obliquely along the jaw; the posterior margin of the palate is acutely and deeply notched, and the palatal foramen is on the maxillary bone. The group to which the common seal belongs was named *callocephalus* by F. Cuvier, on account of the fine shape and large size of the cranium and the shortness of the face; the brain is nearly as large as that of the most intelligent monkeys. This species—the *P. (C.) vitulina* (Linn.), the *phoque commun* and *veau marin* of the French, the *Seehund* of the Germans—attains a length of 4 to 6 ft.; the color varies much, but is generally brownish above and yellowish white below, variously mottled, and sometimes pied and marbled. It is common in the European seas, especially those washing the northern countries; it is fattest in spring; a single large animal will yield from 8 to 12 gallons of oil excellent for lamps; the leather is used for boots, and the hide for caps, trunk covers, &c.; the matter which lubricates the hair has a penetrating and offensive odor. Along the New Brunswick coast this species, which is called there the harbor seal, is often seen in summer; the fur is very handsome, and is highly prized by the Micmac Indians; it is also common all along the New England shore. The Greenland or harp seal (*P. [C.] Groenlandica*, Müll.) is about 6 ft. long; the males are grayish white, with the face and a broad lunate mark on the back and sides black; the females are brownish with blackish spots, and the young snow-white; the molars are in a straight line, with a small interval between them and the anterior tubercle obsolete; the posterior margin of the palate almost directly transverse. They are found in herds on the coast of Greenland on floating ice, rarely venturing on shore or shore ice; they are sometimes floated to the coasts of Great Britain,



Common Seal (*Phoca vitulina*).

and are not uncommon on those of Labrador and Newfoundland. This is the most important of all to the Esquimaux, who harpoon it

from their kaiaks; the oil is the best and most abundant in this species, and the skins form an important article in the fur trade. The young



Greenland Seal (*Phoca Groenlandica*).

are born in spring. A species of seal (*P. Caspica*, Pall.), about the size of the common seal, occurs in the Caspian sea, the sea of Aral, and Lake Baikal; it affords an excellent oil, to obtain which many thousands are annually killed.—In the narrow-muzzled seals belongs the genus *stenorhynchus* (F. Cuv.), with the incisors $\frac{1}{2}$, pointed, and the molars $\frac{2}{1}-\frac{2}{1}$, divided into three to five long points, conical, somewhat hooked, and usually two-rooted; the snout is long and narrow, and the claws, especially on the hind feet, very small, hence called *leptonyx* by Wagner and Gray. The leopard seal or sea leopard (*S. Weddellii*, Less.; *L. leopardinus*, Wagn.) is 9 or 10 ft. long, spotted above somewhat as a leopard, whitish on a grayish brown ground, and yellowish below; the head is long and small, the neck long and tapering, and the hair soft and thin; it frequents the frozen seas of the southern hemisphere, about the South Shetland and South Orkney islands. In the genus *pelagius* (F. Cuv.) the snout is broad and long; the number of teeth is the same as in the last genus, but the incisors are indented and shut into each other, and the molars are thick, compressed toward the crown, with rudimentary points and central conical cusp. The white-bellied or monk seal (*P. monachus*, F. Cuv.) grows to a length of 8 or 10 ft.; it is shining dark brown above, spotted with gray on the neck and head, and the lower parts and portions of the sides white; eyes large and ox-like; it is gentle, easily tamed, intelligent, and affectionate; it is found in the Adriatic sea and on the coast of Sardinia, and was the one best known to the ancients; its skin was believed by the old Romans to be a preservative against lightning, and tents were made of it under which they took refuge in thunder storms.—In the genus *stematoprus* (F. Cuv.) or *cystophora* (Nilss.), the incisors are $\frac{1}{2}$ and conical, the canines large, and the molars $\frac{2}{1}-\frac{2}{1}$, simple-rooted, compressed and striated, with three lobes and many small indentations;

the generic name is derived from a soft crown-like appendage from the nose to the back of the head. The hooded or crested seal (*P. leonina*, Fabr.; *S. cristatus*, F. Cuv.) attains a length of 7 or 8 ft.; the color is dark brown above with gray spots, the young being light-colored; they have on the head a membranous and muscular sac covered with hair, divided into chambers by a prolongation of the nasal septum; when the nostrils are closed this can be inflated with air; the skins are among the most common in the market. They are fond of the ice islands of high northern latitudes, coming down to the coast of Labrador; they are polygamous, fierce when wounded, and fight furiously with each other. The appendage on the head may be, as the fishermen suppose, a reservoir of air for use during submersion, or



Hooded Seal (*Stenmatopus cristatus*)

an accessory to the organ of smell, as its vascular nature seems to indicate.—In *macrorhinus* (F. Cuv.) the incisors are far apart, hooked like small canines, the central ones the smallest; the canines are strong tusks; the molars have simple roots, the crowns appearing like nipples on a rounded base; the number of teeth is the same as in the preceding genus; the forehead is very prominent, the bones as in the elephant for supporting a trunk; the nasal bones are very short, and the maxillaries long with a very large nasal opening between them. The bottle-nosed seal or sea elephant (*M. morunga*, Gray) *proboscideus*, F. Cuv.) is the largest of the seal family, attaining a length of 25 ft. or more, with a circumference of about 16 ft., the size as well as the proboscis justifying the popular name. The males are generally dark grayish blue or brown; they can elongate the muzzle to a foot in length; the females are dark olive-brown above and yellowish below, and do not have the nasal appendage; they are polygamous, and the males in the breeding season are very pugnacious; they have four fingers and a short thumb on the fore limbs with perfect nails, and the hind toes nailless. The hair is rather coarse, but the thick skin is in much request for harnesses; a single animal will yield 14 to 15 bbls. of blubber, from which the oil is obtained as in the whale; the oil is clear, without bad

odor or taste, and burns slowly and without smoke; in England it is used for softening wool and in the manufacture of cloth; the salted tongues are esteemed as food. They are found in large herds on the shores of the islands of the antarctic seas, going north in winter to the coasts of Patagonia, remaining between lat. 35° and 55° S.; they prefer sandy and desert beaches, in the neighborhood of fresh water, in which they like to wallow. They never attack man unless brutally treated by him; from indiscriminate slaughter they are now very scarce in their former accessible haunts. This species is half as large as the Greenland whale, and very much larger than the largest elephant.—The family of *otariadae* or eared seals is very distinct from that of the *phocidae*. Dr. T. Gill, in his "Monograph of the Pinnipeds" (1856), first introduced some order into the confused nomenclature and characters of these seals; and after him J. A. Allen, in the "Bulletin of the Museum of Comparative Zoölogy" (vol. ii., No. 1, 1870), gave special attention to the family. Mr. Allen divides them into *trichophocinae* or hair seals, with the genera *otaria*, *eumetopias*, and *zalophus*, and *oulophocinae* or fur seals, with the genera *arctocephalus* and *callorhinus*. In the *otariadae*, which includes the sea lions and sea bears, the incisors are $\frac{2}{2}$, the four upper middle ones with broad crown divided by a transverse groove, the outer two conical; molars $\frac{2}{2}$ — $\frac{2}{2}$, sometimes with one less above; the fore feet are further back than in the other seals; the hind feet have the membrane prolonged beyond the nails into long straps or ribbons; the fore feet are nailless, and the lower surface of all the limbs is without hair; there are also small external ears, from which these seals are called otaries. The name of sea lion has been given to a number of large seals of both hemispheres, either from their savage appearance, roaring voice, powerful canines, or maned neck. The northern or Steller's sea lion (*eumetopias Stelleri*, Peters) is about 15 ft. long, with a weight of about 1,600 lbs.; the males have stiff curled hair on the neck, a



Southern Sea Lion (*Otaria jubata*).

thick hide, coarse tawny reddish hair, and a mane of erect hair; the head is large, the nose long and truncated, the eyebrows bushy, and

the ears distinct. They are found on the E. shores of Kamtchatka, about the Kurile islands, and the N. W. coast of America, on rugged shores and desert rocks in the ocean; their food consists of fish, the smaller seals, sea otters, and marine birds and animals. The southern sea lion (*O. jubata*, De Blainv.) is of about the same size and general appearance as the last, with similar habits, is heavy and clumsy in its gait, and fears man; it is found in the south seas, sometimes coming to the Patagonian coasts; it is rarely hunted except by savages, though the oil is excellent. The name of sea bear has been applied to many smaller seals of both hemispheres, with a less ferocious aspect but fiercer disposition than the sea lions. The northern ursine seal or sea bear (*Callorhinus ursinus*, Gray) is about the size of a large bear, between 7 and 8 ft. in length; the forehead is much arched, the lips tumid, and the ears nearly 2 in. high; close to the skin is a soft reddish



Sea Bear (*Callorhinus ursinus*).

wool, over which is a dark coarse hair; the females and young are ashy. It is very fat in spring before the young are born; it is polygamous, the males tender to the young but tyrannical to the females; if wounded, it will attack a boat, and is very tenacious of life; it is the terror of the smaller seals and sea otters, and is itself afraid of the sea lion. This species furnishes the greater portion of the fur seal skins of commerce. It is found chiefly on the Pribyloff islands in Behring sea, a group belonging to Alaska, collecting especially on St. Paul's and St. George's islands. The "rookeries" contain several millions of seals; the adult males begin to arrive about the first of May (the great body about the first of June) and the females about the middle of June, giving birth to their young soon after landing; the "bachelor" seals, as males under six years old are called, do not collect on the "rookeries," but have separate "hauling

grounds;" nearly all leave the islands about the end of October or middle of November. The males on the "rookeries" do not go into the water from the time of "hauling up" in May till after the first of August, being sustained in the mean time by the absorption of their own fat. After leaving the islands in autumn, the seals spread out over the North Pacific, following schools of fish, or frequenting shoals and banks where cod are abundant; at this time they are shy and difficult to approach, unless asleep, in which condition they are captured by the natives all along the N. W. coast from the Columbia river to Behring sea; in spring they return to the breeding grounds on the islands. The capture of the seals for their fur begins with their first landing on the islands, and may continue till they begin shedding their fur in August or September; they are killed by the natives with clubs; only the "bachelor" seals are allowed to be captured. The blubber of the fur seal is of a faint yellowish white, and lies entirely between the skin and flesh; it possesses an odor exceedingly offensive, and difficult to wash from the hands. The flesh, when carefully cleaned of fat, can be eaten; it resembles poor, tough, overdone beef. (See *Fur*, vol. vii., pp. 536 and 538.) The southern sea bear (*arctocephalus Falklandicus*, Gray) is smaller than the last, to which it is similar in habits, but larger than the common seal, the males being about 7 ft. long, and the females considerably smaller; the hair is of different colors, black, brownish, gray, and variously spotted with grayish and yellowish, and the under fur is short and fine. It was formerly very abundant about the islands of the southern ocean, especially the Falkland, but is now almost extirpated. Some thousands of skins have recently been obtained, however, at the South Shetland islands by vessels from New London, and there is a small rookery on the Lobos islands protected by the Argentine government. It was from this species that the market was formerly supplied.—A few fossil remains of species nearly allied to the common and monk seals have been found in the upper tertiary formations of Europe and North America, and recently in the Yorktown (miocene) strata of the Atlantic coast, with those of the whale, dolphin, and walrus.—See "The Seal and Herring Fisheries of Newfoundland," by Michael Carroll (Montreal, 1873), and "The Marine Mammals of the Northwestern Coast of North America," by Charles M. Scammon (4to, New York, 1874).

SEAL (Lat. *sigillum*), a piece of metal, stone, or other hard substance on which is engraved some image or device, and sometimes a legend or inscription. It is used for making impressions on wax or like material affixed to legal instruments, as evidence of their authenticity. The word seal sometimes means only the implement employed, but both in legal and in common language it is applied also to the thing impressed. The Bible contains frequent allusions

to seals, and they abound among Assyrian and Babylonian remains. From the East the use of seals passed to Greece and thence to Rome; and it has been common in all the European states from the earliest periods. Among both the Greeks and the Romans the seal was usually set in a ring, whence *annulus* came to be a Latin name for a seal. The word *bullæ* has always been used in Europe to designate specifically an impression in metal, and thus came to be the distinctive appellation of a class of instruments sealed in that way. Such, for example, are the edicts and briefs of the Roman pontiffs (see *BULL*, *PAPAL*), and some constitutions of the German emperors.—The circular form is common to all periods. The ogive, the spade form of the escutcheon in heraldry, appeared with the pointed style in architecture, and in the course of time was exclusively appropriated by abbeys, chapters, bishops, and other ecclesiastical bodies and persons. The oval form was particularly frequent in France during the reigns of the Merovingian and Carolingian kings. The size varied at different periods, and in general the smaller and thicker the seal, the older it is. Those of the Merovingian kings are hardly more than an inch in diameter, while that of Francis I. of France had a breadth of four inches. The Egyptian priests used in sealing a sort of clay. The Byzantine emperors sealed in the form of *bullæ* with lead, and sometimes with silver and gold. Silver *bullæ* are much rarer than those of gold. The wax most anciently employed was white. When, about the 9th or 10th century, wax was made of various colors, only emperors and kings might seal in red. In the 12th century it was customary in France to seal with green wax letters addressed to persons of high eminence. This color was introduced into Germany in the 14th century, and was appropriated by religious houses and cities. Blue seals are very rare, and Charles V. of Germany is said to be the only European monarch who used this color. The patriarchs of Jerusalem and Constantinople, and the grand masters of the order of Malta and of the Teutonic order in Germany, sealed in black. Private persons commonly used yellow wax, and this color is frequent in public documents of about the 12th century.—The devices upon seals throw not a little light upon the manners and usages of different ages, and some of them have positive historical value. The seals of the Romans were engraved with the portraits of their ancestors or friends, with mythological subjects, or with symbolical allusions to the real or mythical history of their families. Perhaps the earliest authentic instance of a seal bearing armorial devices is that of Arnulphus, count of Flanders (941). Such seals were not common until the 13th century. The early seals of religious communities and of cities were inscribed with the image of their patron saint or of some sacred relic, or with the figures of ecclesiastical dignitaries or ma-

gistrates. The name of the owner in seals attached to public documents usually forms part of the inscription. The ancient intaglios were frequently used for seals in the times of the early French kings. They were used chiefly for counter-seals, and by the addition of a pious text or legend it was attempted to give a sacred character to their profane subjects. The most ancient mode of sealing was probably that of applying the wax directly to the parchment. When the instrument was written upon two or more leaves, the wax was made to reach them all by impressing it upon an incision made in the parchment in the form of a cross. The seal was sometimes also made upon the ends of thongs or strips of parchment run through the several sheets. Lead, silver, or gold *bullæ* were almost of necessity appended by a cord or strip. In the 12th century it seems that in France at least pendent seals had displaced the other sort. They are still used generally for letters patent, treaties, and other important public documents. During the 12th century, too, though the practice was not well established until the 13th, arose the contrivance of counter-seals, that is to say, the use of a different impression upon the reverse of the proper seal. They are said to have been first applied to the pendent seals. They were in these cases made of the same size with the chief seals, and the mottoes interrupted on these were continued on the counter-seals.—Although in some periods seals have taken the place of signatures, yet very often seal and signature have been employed together. In Rome, the prætorian law had recognized the validity of testaments that were only sealed by the witnesses; yet an imperial constitution afterward required the adscription of their names also. In the constitutions of the Merovingian and Carolingian kings, the seal ordinarily supports the monogram or signature of the sovereign, but sometimes it stands alone. From the 8th to the 10th century the use of seals in France was confined almost entirely to the kings. Most instruments of this period are attested, so far as the witnesses at least are concerned, only by the mention of their names. About the 12th or 13th century the use of seals among all classes became general, and continued so until the revival of learning and the diffusion of correct writing rendered seals of less use. In England charters and grants of the Anglo-Saxon and Anglo-Danish reigns were authenticated by the signature of the grantor preceded by the figure of a cross. The execution was attested by the subscription of the names of the witnesses, each name being preceded by a cross. Seals were certainly not often used in England until late in the 11th century, and then by no means commonly. There are extant unquestioned seals of Edward the Confessor, and he certainly first adopted a great seal for England; but their general use for authenticating charters and other instruments was not fairly estab-

lished till near the middle of the 13th century. In Scotland, a statute of the time of Robert III. (1390-1406) declared that every baron or tenant *in capite* of the king must have a peculiar seal for his sovereign's service; and a statute apparently in aid of this one, passed in the next reign (James I.), enacts that every freeholder shall appear at the lord's court with his seals, or if he cannot appear in person, he shall send them by his attorney; and it seems to have been customary for gentlemen at this time to deposit copies of their seals in the office of the court of their county, the seal then sufficing without signature to authenticate an instrument. In 1540 a statute of James V. declared that, inasmuch as seals might be lost or counterfeited, all documents must henceforth be not only sealed but subscribed.—From the universal use of seals in England it came to be English law that no charter, grant, or other instrument of conveyance was *factum*, that is, done, or in other phrase a deed, until it was sealed; and such was the virtue of a seal that down to the time of Charles II. it alone sufficed to make a writing valid and binding. The statute 29 Charles II., the so-called statute of frauds, enacted that certain writings should for the future be signed; but it is probably the better opinion that, even since the statute, a deed duly sealed is good without the subscription of a name.—The old common law definition of a seal is that given by Lord Coke: *Sigillum est cera impressa*—"A seal is an impression in wax;" but it has long been held that a wafer or other tenacious substance, on which an impression is or may be made, is a good seal. In many, perhaps indeed most of the United States, neither wax, wafer, nor any other substance is required; a scroll or ring made with the pen in imitation of the seal, or as marking its place, being sufficient. One piece of wax suffices for several signers if stamped with their separate impressions, or several signers may adopt one seal; and an adoption of this sort is inferred when the deed recites the sealing "with our seals," and those who did not in fact seal do yet sign and deliver the deed. The significance of the seal in law at present is, that it imports a deliberate and considered act on the part of him who affixes it. The rule has established itself firmly in the law, that an instrument thus executed with a seal implies a consideration, or in other words that full assent which is essential to the validity of every contract, and which can be inferred only from a seal, or from something of value passing between the parties as the cause of the contract.

SEAL ENGRAVING. See GEM, vol. vii., p. 663.

SEA LEOPARD. See SEAL.

SEA FISHERY. See SEAL.

SEA LION. See SEAL.

SEALSFIELD, Charles, a German author, whose real name was KARL POSTEL, born at Poppitz, Moravia, March 3, 1793, died near Solothurn, Switzerland, May 26, 1864. He became secre-

tary of a religious order at Prague, but escaped from his convent about 1822, and in 1832 settled in a farm house at Solothurn, both before and after which time he resided much in the United States, and visited Mexico and Central America. His principal works are: "Tokeah, or the White Rose" (2 vols., Philadelphia, 1828; in German under the title *Der Legitime und der Republikaner*, 3 vols., Zürich, 1833); *Transatlantische Reiseskizzen* (2 vols., 1833); *Der Virey und die Aristokraten*, a Mexican novel (2 vols., 1834); *Lebensbilder aus beiden Hemisphären* (2 vols., 1834; 2d ed., entitled *Morton, oder die grosse Tour*, 1846); and *Süden und Norden* (3 vols., 1842-'3). These and others of his works have been translated into English, and several of them into French. Two complete editions have been published at Stuttgart (15 vols., 1845-'7, and 18 vols., 1846).—See *Erinnerungen an Sealsfield*, by Kertbény (Brussels and Leipsic, 1864). A monument to him was erected in 1875 in his native place.

SEAMAN, a sailor. Seamen may be hired in four ways. 1. They may be employed for a certain voyage and receive a certain proportion of the freight earned. This contract is probably rarely made in this country, except for small coasting vessels. 2. They may be hired for a certain voyage or by the run, and paid a round sum at the close, and this is not very unusual. 3. They may be hired on shares, which is a practice nearly if not quite confined to whaling and fishing vessels. 4. But much the most common usage is to hire them for some definite voyage or voyages, or for a definite period, on monthly wages. Under penalty of a considerable forfeiture, the United States laws require that every master of a vessel bound from a port in the United States to any foreign port, or of any ship or vessel of the burden of 75 tons or upward bound from an Atlantic to a Pacific port or *vice versa*, shall have shipping articles, which must be signed by every seaman on board, and must describe accurately the voyage and the terms upon which the seaman ships. Articles which are less particular are required in case of vessels of 50 tons and upward bound from a port in one state to a port in any other than an adjoining state. Wherever there is doubt as to the meaning of the obligation, the sailor, rather than the ship owner, has the benefit of the doubt. The shipping articles ought therefore to declare explicitly the ports of the beginning and end of the voyage, and in all other respects ought to be clear and fair. To all clauses or stipulations which tend to lessen the usual rights of the seaman, it must appear that he gave intelligent and deliberate assent. Accidental omissions in the articles may be supplied by parol; and a seaman may also by parol show that the voyage or time represented to him was not that which appears in the papers, or that the articles have been altered since they were subscribed. The owner is bound to

provide a seaworthy ship, and our statutes furnish the means of lawfully ascertaining her condition on the complaint of one of the mates and a majority of the crew, by a regular survey at home or abroad. If seamen, after shipping, refuse to proceed on the voyage and are arrested for the mutiny, the condition of the vessel, if that is the excuse, is inquired into by the court; and if she is found unseaworthy, their punishment is reduced and mitigated accordingly. So, unseaworthiness is a sufficient defence to the charge of endeavoring to commit a revolt by compelling the master to return to port. Provisions of due quality and quantity are to be furnished by the owner, under the general principles of law as applied from the earliest times to this particular contract. The quantity for each man on board is here prescribed by statute, under penalty of a day's wages to every seaman for the days on which he is on short allowance. But these wages are not to be paid if the necessity of short allowance arose from a peril of the sea or any accident of the voyage, or the delivery of a part of the provisions to another vessel in distress. Nor, as it is clear that the master must have a discretion in the expenditure of the provisions, is putting the crew on an allowance necessarily the same thing as putting them on short allowance. A deficiency in one kind of provisions is not compensated by an abundance of another. By the general law merchant there is an obligation upon every ship owner or master to provide for a seaman who becomes sick, wounded, or maimed in the discharge of his duty, whether at home or abroad, at sea or on land, if it be not by his own fault, suitable care, medicine, and medical treatment, including nursing, diet, and lodging. Sickness is provided for by express statutes, which go so far as to require that every ship bound from a port of the United States to any foreign port, or being of the burden of 75 tons and upward and bound from an Atlantic to a Pacific port or *vice versa*, should have a proper medicine chest on board. Whenever other appliances are required, or whenever surgical skill, or attendance, or nursing, other and better than that which the ship can afford, becomes necessary, the expense will be charged on the owners under the general maritime law. By other statutes the master may deduct 40 cents a month from every seaman's wages to make up a fund for the support of marine hospitals, in which every sailor may have medical treatment.—Disobedience or misconduct of a sailor is of necessity punishable with great severity. Formerly there was no specific limit to the right of punishment; it might be administered by the master in any form and in any measure, he always being responsible for any excess or cruelty, both criminally and in damages to the seaman. But by the statute of 1850 flogging is abolished and prohibited. This has been declared by very high authority to include the

use of the cat and every similar form of punishment, but not necessarily to include all corporal punishment, such as a blow with the hand, or a stick or rope. The statute contemplates deliberate flogging, and not that sudden violence, like blows, which may be inflicted in an emergency, to compel immediate obedience. Generally the only punishments which can now be resorted to, to secure good conduct, are forfeiture of wages, irons, imprisonment, hard labor, and such other means as may be invented in the place of flogging. The penalty of forfeiture of wages may not be imposed for one trivial act of irregularity, nor for a single or occasional act of intemperance; the offence must be habitual to warrant the infliction of the penalty. The master or a seaman may forfeit all his wages for smuggling; or the damage actually sustained by the owners of the vessel from this offence may be charged upon the wages of the offender, but only those wages earned before the act of misconduct are forfeitable.—Desertion is distinguished from absence without leave by the intention not to return. Thus, it is not desertion for the seaman to leave the ship, against orders, for the purpose of entering complaints for ill treatment before the consul; nor is it desertion when the vessel is left for a good cause, as a change of the voyage without consent, cruelty, insufficient provisions, or unseaworthiness of the ship. The seaman must be received, if he offers to return in a proper way and in a reasonable time, before any other person is engaged to take the place. If he returns after desertion and is received by the master, or by the owner, this is a condonation of his offence and a waiver of the forfeiture, and it has this effect even if there be a clause to the contrary in the shipping articles. If the sailor deserts before the voyage begins, by not rendering himself on board, he forfeits his advance wages and an equal sum in addition, or he may be apprehended under the warrant of a justice and be compelled to go on board. If he deserts on the voyage, he forfeits all or any part of his wages and all or any part of his property on board the ship.—The right of the sailor to be brought back to his home is very jealously guarded by our laws. Every ship must be provided with the shipping articles and a shipping list verified under the oath of the master; this he is required to present to the consul or commercial agent of the United States at every port which he visits, when so requested, and is under bond to deliver to the boarding officer who comes on board his ship at the first home port which he reaches, and to produce the persons named therein that it may be ascertained that he has his whole crew on board. If it appears that any of them are missing, he must account for their absence. If he discharges any of them abroad, with his or their own consent, he must pay to the American consul of the port or the commercial agent, over and

above the wages then due, three months' wages, of which two thirds are paid to the seaman, and one third retained by the consul and remitted to the treasury of the United States, to form a fund for the maintenance of American seamen abroad and for bringing them home. If repairs to the ship become necessary, or if the ship is captured, the seamen may hold on for a reasonable time awaiting the prosecution of the voyage; and if discharged before this time has elapsed, they may claim their extra wages. The discharge of a seaman for good cause, like disobedience, misconduct, or disability by his own fault of extreme degree, may be authorized by our consuls or commercial agents in foreign ports. If the ship is unseaworthy, the shipping articles are violated by the master, or the sailor is subjected to cruel treatment, he may be discharged by a consul and recover his three months' pay. If the master discharges the seaman, against his consent and without good cause, in a foreign port, he is liable to a fine of \$500 or six months' imprisonment, and the seaman may recover full indemnity for all loss or expense incurred by such discharge.—It is an ancient maxim of the maritime law that freight is the mother of wages, so that where no freight is earned no wages are earned. But, more properly speaking, wages are earned whenever freight is or might be earned, for the sailor ought not to and does not lose his dues when the ship fails to earn freight on account of the fraud or wrongful act of the master or owner. Nor will any special contract between the owner and the freighter, varying the obligation to pay freight from that implied by the general law, have any effect upon wages. If the voyage is broken up, or the seamen are dismissed without cause before the voyage begins, they have their wages for the time they serve, and a reasonable compensation for special damages. In cases where the voyage is broken up by misfortune, so that the master would be justified in discharging the crew, they are still entitled to their wages. So a seaman has full wages if he is compelled to desert by the cruelty of the master, or if he is disabled by sickness, even if, by reason of that sickness, he was obliged to be left at a foreign port. Seamen have a lien for their wages on the ship and freight. Statutes give the same lien to fishermen on shore. It attaches not only to ship and freight *in re*, but to the proceeds of both or either, and follows them into whose hands soever they may go. It prevails over bonds of bottomry and other like hypothecations, because the services of the sailor save the ship for all claimants. Pilots, engineers, firemen, and deck hands are seamen, and have this lien, and so have all persons whose service is materially and directly useful to the navigation of the vessel. A seaman cannot insure his wages, nor derive any benefit from the insurance effected by owners on ship or freight. It is the policy of the law, for obvious rea-

sons, to make the sailor find all his interest in the security and welfare of the ship.

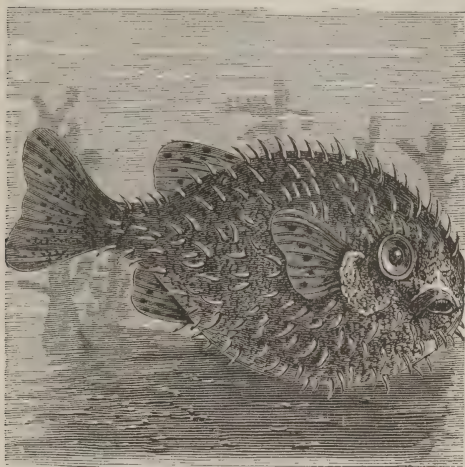
SEA MOSSES. See POLYZOA.

SEA NETTLE. See ACALEPHÆ, and JELLY FISH.

SEA PIE. See OYSTER CATCHER.

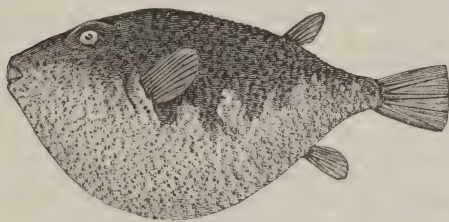
SEA PORCUPINE, a common name of the osseous fishes of the order *plectognathi* (with comb-like gills), family *diodontidæ* or gymnodonts, and genera *diodon*, *tetraodon*, &c., so called from the spines with which the body is studded. This order, which contains the sun fish, trunk fish (see TRUNK FISH), and file fish, has the internal skeleton partly ossified, and the skin covered with ganoid scales or spines; the maxillaries and intermaxillaries are wholly or in part united, and the upper jaw in most is immovably fixed to the cranium; there are no pancreatic cæca, no well developed ventrals, no duct to the air bladder, and only vestiges of ribs. In the family of gymnodonts the teeth are incorporated with the bone of the jaws, and resemble a parrot's beak with or without mesial division, their plates consisting of hard dentine adapted for bruising and cutting the crustaceans, mollusks, and sea weeds upon which they feed. The skin is thick, leathery, and armed with spines which stand out in every direction when the body is inflated by filling with air the stomach, or more properly a large sac beneath this organ communicating with the œsophagus; the air is forced into this sac by swallowing; when thus distended the fish loses all command over its fins, and rolls over belly upward, floating at the mercy of the wind and waves; as it is a considerable time before the air can be sufficiently expelled to allow the fish to resume the full control of its movements, many are caught in this helpless condition; they emit a blowing sound when taken, from the expulsion of the air; the tail is short and feeble; the spinal cord, according to Owen, is very short. Some of the family have no external openings to the nostrils, the nerve of smell being expanded on cutaneous tentacles. The flesh of some is poisonous. They are very tenacious of life, on account of the small size of the gill openings, and have a disagreeable odor which is retained even in alcohol for years; they are mostly inhabitants of tropical seas, and are rarely more than 2 ft. in length, with the diameter of the inflated body more than half of this.—In the genus *diodon* (Linn.) there is no mesial division of the jaws, and the teeth are apparently only two; the spines are long, thin, sharp, with two root-like processes, and capable of erection. There are nine species, of which three are described by Mitchill as occurring on the coasts of the United States, under the name of balloon fishes; these are the *D. maculo-striatus*, about 6 in. long, greenish spotted and striped with dark; the *D. pilosus*, smaller, with most of the body furnished with soft, flexible bristles of a golden color; and the *D. verrucosus*, with a warty and spiny skin. The atinga (*D. hystrix*, Bloch), of the East In-

dian, S. African, and South American coasts, is the best known to seamen; it is caught in nets or on hooks, and is very difficult to handle from the sudden erection of the spines



Balloon Fish (*Diodon pilosus*).

and the active motions of the body.—In *Tetraodon* (Linn.) there is a mesial suture in the jaws, so that there appear to be two teeth above and two below; the spines are very short, and the head, back, and tail are generally smooth. The *T. electricus* (Paterson), with electric properties, has the skin entirely smooth. (See ELECTRIC FISHES.) There are several species on the American coast, of which the most common is *T. turgidus* (Mitch.), 6 to 14 in. long, olive-green above and whitish below; the abdomen lax, covered with prickles

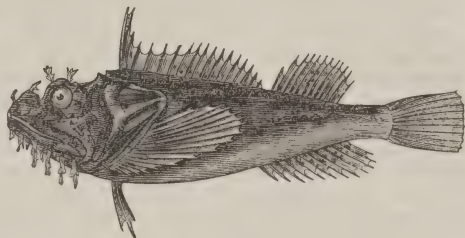


Puffer or Swell Fish (*Tetraodon turgidus*).

and capable of considerable distention; it is not uncommon about Martha's Vineyard, and on the Massachusetts and New York coasts, where it goes by the names of puffer and swell fish. Other names for this and the preceding genus are globe fish, urchin fish, and spine-belly.

SEA RAVEN, an acanthopterous fish of the bullhead or sculpin family, and genus *hemitripterus* (Cuv.), one of the ugliest of this ugly group. The head is flattened, rough, and spiny; the pectorals are large and wing-like, advancing far under the throat, and with no free rays; ventrals under the pectorals, consisting of a spine and three or four soft rays;

the first dorsal deeply notched, and all the fin rays simple; the head and jaws are furnished with numerous cutaneous branching filaments, which with the spines and huge mouth render the physiognomy of the fish anything but pleasing; there are sharp, card-like teeth on the jaws, vomer, palate, and pharyngeal bones; the tongue is smooth, the branchiostegal rays six, and the body without scales. The typical species is the common sea raven (*H. Acadianus*, Storer), called also the Acadian bullhead and deep-water sculpin; it attains a length of 2 ft. and a weight of 4 or 5 lbs. The colors present every shade of dark brown, blood red, pinkish purple, and yellowish brown, with various markings and bands; yellowish white below. The form is sculpin-like; the head is large, about a quarter of the whole length, with enormous gape and hideous appearance; the whole body above the lateral line is granulated, and thickly studded with tubercles; the first three rays of the first dorsal are longest, and with the other rays of this fin are fringed at the end. It is not unfrequently taken on



Common Sea Raven (*Hemitripterus Acadianus*).

hooks by cod fishermen in deep water in Nova Scotia, in the gulf of St. Lawrence, and near the New England and New York coasts, especially around the ledges of Massachusetts bay. Like the land raven, it is omnivorous and voracious, acting the part of a useful scavenger in removing decaying matters.

SEARCH, Right of, the right of a belligerent to visit, by his lawfully commissioned cruisers, all private ships sailing on the high seas, and to examine their papers, and their cargoes if need be, in order to ascertain their destination and character. It is a familiar doctrine of international law that the ships of a state form a part of its domain, and that over them, as over its landed territory, the sovereignty of the state extends supreme and inviolable. In a time of general peace, these ships cannot be detained or boarded by the public ships of another power for the purpose of inquiry into their character or business, because such an act is an intrusion upon and in derogation of the sovereignty of the state whose ships are so visited. In time of war, however, the general consent of nations yields to the belligerents the privilege of visiting and searching ships professing to be neutral, in order that they may know that the neutral flag does not mask

an enemy or cover contraband of war. So firmly is this rule or right established that there is no doubt or dispute about it among institutional writers, and it has never been successfully resisted in the practice of nations. During the American revolutionary war, and in 1801, the Baltic powers declared that the flag of a state was a substitute for all documentary proof, and excluded the right of search. They armed themselves for the purpose of defending and maintaining this position, but they were soon compelled to abandon it, and since that time the usual war right has been considered incontrovertible. The question was once submitted in the English admiralty whether neutrals might not compel a belligerent to refrain from exercising his right by putting their ships under the convoy of a public ship of their country. It was adjudged that the belligerent was not bound to accept such a substitution, nor indeed in any respect to vary his right of personal visitation. It may be remarked in passing that two powers sometimes regulate or restrain by treaty the right of maritime search by ships of war. The English doctrines upon the war right of search have been generally admitted in this country, except as to the claim put forth by England of a right to search neutral vessels on the high seas for deserters and other persons liable to military and naval service. The difference upon this point was one of the chief causes of the war of 1812, and the matter has never yet been specifically settled, but it cannot be supposed that the British claim will ever be reasserted. Recent modifications of belligerent rights have not materially limited or affected the right.

SEARCY, a N. county of Arkansas, intersected by the Buffalo fork of White river; area in 1870, about 950 sq. m., subsequently reduced by a portion taken to form Stone county; pop. in 1870, 5,614, of whom 30 were colored. The surface is hilly and the soil productive. Extensive forests cover a large portion of the county. The chief productions in 1870 were 21,961 bushels of wheat, 263,812 of Indian corn, 11,852 of oats, 25,008 lbs. of tobacco, 4,389 of wool, and 2,180 bales of cotton. There were 1,512 horses, 200 mules and asses, 1,619 milch cows, 2,886 other cattle, 2,711 sheep, and 15,682 swine. Capital, Marshall.

SEA ROBIN. See GURNARD.

SEARS, Barnas, an American clergyman, born in Sandisfield, Mass., Nov. 19, 1802. He graduated at Brown university in 1825, studied theology at Newton, Mass., was pastor of the first Baptist church in Hartford, Conn., for two years, and in 1829 became a professor in the Hamilton literary and theological institution, now Madison university, New York. In 1833 he went to Germany to study, and on his return was appointed to a professorship in the theological seminary at Newton, and for several years was its president. In 1848 he was made secretary and executive agent of the Massachusetts board of education. In

August, 1855, he was elected president of Brown university, which office he held till February, 1867, when he became general agent of the Peabody education fund. He received the degree of D. D. from Harvard university in 1841, and LL. D. from Yale college in 1862. Dr. Sears has published "Ciceroniana, or the Prussian Mode of Instruction in Latin" (1844); "Select Treatises of Martin Luther in the Original German" (1846), with philological notes; "Life of Luther, with special reference to its earlier Periods and the Opening Scenes of the Reformation" (1850); and a revised edition of Roget's "Thesaurus" (1854). He edited the "Christian Review" for several years.

SEARS, Edmund Hamilton, an American clergyman, born in Sandisfield, Mass., in 1810. He graduated at Union college in 1834, and at the Harvard divinity school in 1837. In 1839-'40 he was pastor of the first Unitarian church in Wayland, Mass., and in 1840-'47 in Lancaster, Mass. In conjunction with the Rev. Rufus Ellis, he edited for several years the "Monthly Religious Magazine," Boston; and in 1865 he became pastor of the Unitarian church in Weston, Mass. He has published "Regeneration" (Boston, 1853; 9th ed., 1873); "Pictures of the Olden Time" (1857); "Athanasia" (1857; 11th ed., enlarged, 1873, with the title "Foregleams and Foresplendors of Immortality"); "The Fourth Gospel the Heart of Christ" (1872); and "Sermons and Songs of the Christian Life" (1875). He received the degree of D. D. from Union college in 1871.

SEA SERPENT, a marine animal, by many considered fabulous, said to inhabit chiefly the northern seas, especially about the coasts of Norway and New England. The idea of a sea serpent originated in northern Europe, and was at first clearly mythological. Though hundreds of witnesses aver that they have seen this animal, naturalists have failed to discover any certain traces of it. For an account of its visits to Norway the reader may consult Pontoppidan's "Natural History of Norway" (fol., London, 1755), and vol. viii. of the "Naturalist's Library" (Edinburgh, 1841); and for its occurrence on the American coasts, vols. ii., xi., xii., and xxviii. of the "American Journal of Science," the "Report of the Committee of the Linnean Society of New England" (Boston, 1817), Sir Charles Lyell's "Second Visit to the United States" (London, 1849), and Gosse's "Romance of Natural History" (London, 1860-'62). This animal is said to appear in calm weather, with a slender body from 60 to 100 ft. long, a broad snake-like head as large as that of a horse, large eyes, and a long and narrow neck, and of a general dark brown color; some describe it as having fins. It is seen swimming at the surface, with the head and neck elevated, progressing swiftly, apparently by a vertical undulating motion. There does not seem to be any fish to which this animal can be referred. Many fossil types of marine animals have been transmitted, with

or without interruption, from remote geological epochs to the present time; among these may be mentioned the Port Jackson shark (*cestracion*), and the gar pike (*lepidosteus*), which have come down to us without interruption, *chimara*, *percopsis* of Lake Superior, and soft-shelled tortoises (*trionychidae*), with more or less apparent disappearance. Several years ago it was suggested that the closest affinities of the sea serpent are with the marine lizards or enaliosaurians of the secondary age, and especially with the plesiosaurus. (See PLESIOSAURUS.) On the above principle it is maintained that the enaliosaurians, found in the secondary, may have disappeared, actually or apparently, in the tertiary, to reappear at the present time. This is also the opinion of Agassiz, as given in the report of his lectures in Philadelphia in 1849, and reaffirmed in his "Geological Researches" (1871). Mr. Gosse has collected from various sources the arguments showing that the non-occurrence of dead animals is of little weight as disproving the existence of the sea serpent; its carcass would float only a short time, and the rock-bound coasts of Norway would be very unlikely to retain any fragment cast up by the waves; many whales are known to naturalists only from two or three specimens in as many centuries. The zeuglodon, a mammalian type of the tertiary epoch, coming near to the cetaceans and in some respects to the seals, may present some claim to be the sea serpent. (See ZEUGLODON.) The conclusion of the best naturalists is that the existence of the sea serpent is possibly a verity, and that it may prove to be some modified type of the secondary enaliosaurians, or possibly some form intermediate between them and the elongated cetaceans.—See "Proceedings of the Boston Society of Natural History," vol. xvi. (March, 1874).

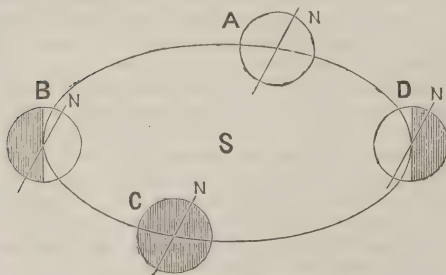
SEA SICKNESS, an affection attended with nausea and vomiting, produced by the motion of a vessel at sea. Similar symptoms are also produced by swinging, waltzing, and riding backward in a coach; but the greater and more regular oscillations of a ship have a stronger effect upon the nervous system. The susceptibility to this malady varies greatly; some persons never experience nausea from this cause; others may only suffer a few hours during a voyage of several days; while still others are almost constantly sick while aboard ship, and fatal cases have been known. The premonitory symptoms are vertigo and sometimes headache, and a peculiar feeling of "sinking" and distress at the pit of the stomach. Nausea soon appears, attended by distressing and convulsive vomiting and frequently diarrhoea. It is more likely to attack those who are debilitated, or who have suffered nervous exhaustion or excitement consequent upon making preparations for the voyage, especially if there has been imprudence in taking food. Dr. Chapman, who wrote a pamphlet "On Sea

Sickness, its Nature and Treatment" (London, 1864), is of opinion that "the motions of the vessel cause the accumulation of an undue amount of blood in the nervous centres along the back, and especially in those segments of the spinal cord related to the stomach and the muscles concerned in vomiting." The remedy which he asserts is the most scientific and efficacious is the application of ice bags to the spinal column, which act, according to his theory, as a sedative. They are made of thin caoutchouc, and are worn by the patient while walking about in ordinary apparel. Dr. For-dyce Barker, in a pamphlet on sea sickness, advises the observance of the following rules, which are principally preventive. In short passages over rough water, those who are susceptible should make a hearty meal not more than two or three hours before going on board, and should keep as near as possible to the centre of the vessel, and lie down before she gets under way. The person should be well covered and shielded as much as possible from disagreeable sights and smells. For ocean passages similar care as to location should be observed in selecting berths. As a general rule of prevention, Dr. Barker advises regular and hearty eating in bed for one or two days, and during the voyage to take coffee or tea or some drink and food before rising in the morning. There is often a tendency to constipation, which may be overcome by the use of laxatives. During an attack, especially if accompanied by diarrhoea, medicines similar to those used in cholera morbus may be taken, as tincture of camphor, tincture of lavender combined with tincture of opium and tincture of capsicum, or a few drops of chloroform. Stimulating liniments may be applied to the pit of the stomach. If during the voyage the weather becomes rough, it is advisable to go to bed before getting sick.

SEA SNIPE. See BELLOWS FISH, and PIPE FISH.

SEASONS (Fr. *saisons*), the quarters of the year, spring, summer, autumn, and winter. These periods are determined astronomically by the apparent movements of the sun (the real movements of the earth) in the ecliptic. The passage of the sun across the equator, bringing on days of greater length than the nights, marks the vernal or spring equinox, and occurs about March 21 for the northern hemisphere and Sept. 23 for the southern. These dates also mark the autumnal equinox or commencement of the autumn, the hemispheres being reversed. The summer solstice, when the day is of greatest length and the astronomical summer begins in the northern hemisphere, is about June 21, and the winter solstice about Dec. 21. In the figure, S represents the position of the sun, A the position of the earth at the vernal equinox in the northern hemisphere (about March 21), and N the north pole. Both poles just catch the light of the sun, and in all other parts of the

world the days and nights are equal; but at the north pole the sun is just rising, at the south pole he is just setting. B represents the position of the earth at the summer solstice (about June 21). The north pole has been continually exposed to the sun for three months, and it is the noon of the north polar day. The direct light of the sun reaches about $23^{\circ} 28'$ beyond the pole, and consequently anywhere within that distance of the pole the sun is visible during the whole 24 hours. Within the same distance of the south pole it is continual night. (See POLAR CIRCLES.) C is the position of the earth at the autumnal equinox of the northern hemisphere (about Sept. 23), but the sun is just setting at the north pole and just rising at the south, and again everywhere else the days and nights are equal. D is the position of the earth at the winter solstice of the northern hemisphere (about Dec. 21); it is the noon of the south polar day, the midnight of the north polar night. It will be seen that at the poles the day and the year are coincident, if we consider a day as made up of one period during



Positions of the Earth in its Orbit.

which the sun is visible and one during which he is invisible.—The popular divisions of the year do not correspond with those of the astronomer, and are not the same in different countries. In England the spring begins with February, summer with May, autumn with August, and winter with November; but in the United States the seasons begin respectively with the months succeeding those named. The marked changes in the amount of heat and light imparted by the sun in the different seasons upon those portions of the earth outside the tropics are not experienced in the equatorial regions. The sun as it passes twice each year over these regions sends down its rays so directly upon them, that the variations of temperature are comparatively inconsiderable; but the regular winds and rains and dry periods consequent on the movement of the sun in the ecliptic are the most marked periodic phenomena, and by these the year is divided into two dry and two wet seasons.

SEA SPIDER. I. See SPIDER CRAB. II. The common name of certain marine arachnids of the order *podosomata*. They have no respiratory organs, and only four pairs of legs, which

in some forms attain an extraordinary length; they are grotesque-looking, and are found at low water on stones or marine plants, or attached as parasites to other animals.

SEA SQUIRT, a name popularly given to the single ascidians or tunicates, from their power of forcibly ejecting water from their muscular sacs. (See MOLLUSCOIDS.)



Sea Spider (*Pycnogonum littorale*).

SEA SWALLOW. See TERN.

SEATON, William Winston, an American journalist, born in King William co., Va., Jan. 11, 1785, died in Washington, D. C., June 16, 1866. He successively edited the "Petersburg Register," the "North Carolina Journal" at Halifax, and the "Register" at Raleigh, N. C.; and in 1812 became partner with his brother-in-law Joseph Gales, jr., in the "National Intelligencer" at Washington, which, after the death of Mr. Gales in 1860, he continued to edit alone till 1865. From 1812 to 1820 Gales and Seaton were the exclusive reporters as well as editors of their journal, one of them devoting himself to the senate and the other to the house of representatives. Their "Register of Debates" is one of the standard sources of American history. For 12 consecutive years, beginning with 1840, Mr. Seaton was elected mayor of Washington city. (See GALES, JOSEPH.)

SEA UNICORN. See NARWHAL.

SEA URCHIN. See ECHINUS.

SEA WEEDS. See ALGÆ.

SEA WOLF. See WOLF FISH.

SEBASTE. See SAMARIA.

SEBASTIAN, a W. county of Arkansas, bounded W. by the Indian territory and N. by the Arkansas river; area, about 600 sq. m.; pop. in 1870, 12,940, of whom 1,354 were colored. The Poteau hills, a southern offshoot of the Ozark mountains, traverse a part of the county, and are rich in minerals. The soil is well adapted to grazing and the production of grain and cotton. Bituminous coal is abundant. The chief productions in 1870 were 18,518 bushels of wheat, 362,019 of Indian corn, 16,084 of oats, 25,453 of sweet and 13,703 of Irish potatoes, 2,215 bales of cotton, 28,289 lbs. of tobacco, 3,494 of wool, 142,347 of butter, 11,675 gallons of sorghum molasses, and 1,099 tons of hay. There were 3,060 horses, 670 mules and asses, 4,284 milch cows, 1,040 working oxen, 5,437 other cattle, 2,788 sheep, and 35,848 swine. Capital, Greenwood.

SEBASTIAN, Dom, king of Portugal, born in Lisbon, Jan. 20, 1554, killed in battle in Africa, Aug. 4, 1578. He succeeded his grandfather John III. in 1557, and in his 21st year undertook with 800 or 900 soldiers an expedition against Tangier, the result of which encouraged him to still greater effort. The war raging in Morocco between Muley-Malek and his nephew Muley-Mohammed, the latter of

whom had been deprived of the throne by the former, seemed to offer a favorable opportunity for the Portuguese monarch to interfere. With a large fleet, having on board 15,000 or 20,000 soldiers, he sailed to Africa to support the cause of the nephew in 1578. He found Muley-Mohammed at Tangier, but the landing of his forces took place at Azila, where he was joined by Muley-Mohammed with his forces, and together they began the campaign by the siege of Alcazar. Muley-Malek, who had collected an immense army, gave battle, Aug. 4. After a desperate engagement, in which Sebastian displayed great heroism but no generalship, his army was routed and almost all killed or taken prisoners; and he himself disappeared, but his dead body is said to have been recognized on the field by a page. Muley-Mohammed was drowned in the flight, and Muley-Malek, who had risen from his sick bed to participate in the action, died, so that all the chiefs perished. The flower of the Portuguese nobility was destroyed in this expedition, and Portugal, becoming a prey to anarchy, soon fell into the power of Spain. But the Portuguese could not believe that their king had been killed, and many adventurers sprung up who gave themselves out as the true Sebastian. Among these impostors the most remarkable was one who appeared in Venice 20 years after the battle, and asserted that he was left upon the field among the dead and wounded; that he had remained in Barbary, finally took the resolution of disclosing himself to the pope, on the way was plundered by robbers, and was recognized by a few Portuguese and taken to Venice. The senate of that city banished him, and on his return imprisoned him; but his case excited universal sympathy in Europe, and he was finally set at liberty. He was imprisoned again at Florence, then taken to Naples, and, insisting upon his statements, was treated as a galley slave. He is said to have died in prison in Castile.—See *Le faux Don Sébastien*, by D'Antas (Paris, 1865).

SEBASTIAN, Saint, a Roman martyr, born at Narbonne in Gaul about 255, died in Rome, Jan. 20, 288. According to the "Acts of St. Sebastian," written before 403 and attributed to St. Ambrose, he was educated in Milan, became a captain of the prætorian guard, and distinguished himself by his zeal in spreading the Christian faith. Being summoned for this before the emperor Diocletian, he refused to abjure Christ, and was shot with arrows and left for dead, but was found still alive by a Christian woman, through whose care he was restored. Having ventured to appear before Diocletian to remonstrate against his cruelty, he was beaten to death with clubs and his body thrown into a sewer, but afterward recovered. A church was built over his tomb by Pope Damasus (366-384); and his remains, according to some writers, were given to the abbot of St. Denis, near Paris, by Pope Eugenius II. (824-827), but were deposited at St.

Medard in Soissons. Portions of his relics were distributed throughout Christendom. He became one of the most popular saints of the middle ages, innumerable churches were named after him, and the acts of his martyrdom were a favorite theme for artists. He is generally represented as tied to a tree and pierced with arrows. His feast is celebrated on Jan. 20 in the Latin church, and on Dec. 20 by the Greeks.

SÉBASTIANI, François Horace Bastien, count, a French soldier, born near Bastia, Corsica, Nov. 11, 1775, died in Paris, July 21, 1851. After several years' service, he became prominent in the Italian campaigns of Bonaparte, whom he aided in the *coup d'état* of the 18th Brumaire, and who after the battle of Austerlitz (1805) appointed him general of division. In 1802 he visited Constantinople to alienate Selim III. from Russia and England. In 1806 he went there again as ambassador, and thwarted English intervention; but the success of his mission was frustrated by the sultan's deposition. Subsequently he joined the army in Spain, from which he withdrew in May, 1810, after incurring Napoleon's displeasure by boasting too much of his exploits. In the Russian campaign of 1812, and in the battles of 1813 and 1814, he displayed great valor. On the first abdication of the emperor he joined the Bourbons, but went over to Napoleon after his return from Elba. In 1819 he was elected to the chamber of deputies, of which he remained a member for many years. Under Louis Philippe he became minister of marine in August, 1830, and of foreign affairs in November. His blind devotion to the king's peace policy led to his retirement in October, 1832, but in the following March he reëntered the cabinet as minister without a portfolio. He finally withdrew, April 1, 1834, on the rejection by the chamber of his provisional indemnity treaty with the United States. He was ambassador to Naples in 1834-'5, and to London in 1835-'40, after which he was made a marshal. In 1847 his only daughter was murdered by her husband, the duke de Praslin.

SEBASTOPOL, or *Sevastopol*, a fortified city of Russia, in the Crimea, on a peninsula on the S. side of the roadstead of the same name, an arm of the Black sea, 190 m. S. E. of Odessa; pop. about 12,000. It has a celebrated harbor $3\frac{1}{2}$ m. long and from 700 yards to 1 m. wide. In 1854-'5 the place was invested by the allied English, French, Sardinian, and Turkish armies, and after a protracted siege was taken, Sept. 8, 1855. (See CRIMEA.) One of the churches was erected by Vladimir I., the first Christian czar, out of the remains of the ancient cities of the Chersonesus. In 1780, when Russia commenced fortifying Sebastopol, it was a small Tartar village named Akhtiar. It became a city remarkable for fine streets, buildings, and quays, and as one of the greatest military harbors in the world; and before the Crimean war it had a population of about 47,000, including many marines and soldiers,

but only 4,500 women. Much of it has since been rebuilt.

SECCHI, Pietro Angelo, an Italian astronomer, born in Reggio in Emilia, July 29, 1818. He became a Jesuit Nov. 3, 1833, studied mathematics under Padre de Vico, and taught physics in the college of Loreto from 1841 to 1843. In 1844 he began his course of theology in the Roman college, completed it at Georgetown college, D. C., in 1848-'9, and taught physics and mathematics there till the autumn of 1850, when he was recalled to Rome. He was then appointed director of the observatory of the Roman college, reconstructed it on a new site and plan, invented and perfected a system of meteorological observation, published a monthly bulletin continued till 1873, and constructed a meteorograph much admired at the Paris exhibition of 1867. He was commissioned by Pius IX. to complete the trigonometrical survey of the Papal States begun by Boscovich in 1751, and to rectify the measurements already made of the meridional arc, and executed successfully a commission to bring a supply of water to Rome from Frosinone, 48 m. distant. The results of his labors in every field of astronomical research since 1850 are chronicled in the scientific periodicals of Italy, France, Germany, and England. He is especially distinguished for his discoveries in spectroscopic analysis and in solar and stellar physics. After the closing of the Roman college and the expulsion of the Jesuits (1870-'73) Secchi was allowed to retain his post, continued to lecture on astronomy in the ecclesiastical schools of Rome, and in 1875 he was sent by the Italian government on a scientific mission to Sicily. Among his important publications are: "Researches on Electrical Rheometry," originally in the "Smithsonian Contributions to Knowledge" (Georgetown, 1852); *Quadro fisico del sistema solare secondo le più recenti osservazioni* (Rome, 1859); *Catalogo delle stelle* (Paris, 1867); *Sugli spettri prismatici delle stelle fisse* (Rome, 1868); *Le recenti scoperte astronomiche* (1868); *Nove ricerche sulle protuberanze solari* (1869); *Sur l'influence de l'atmosphère sur les raies du spectre et sur la constitution du soleil* (1869); *Fisica solare: sulle ultime scoperte spettroscopiche fatte nel sole* (1869); "Spectrum Observations on the Rotation of the Sun" (London, 1870); *Le soleil: exposé des principales découvertes modernes sur la structure de cet astre, son influence et ses relations avec les autres corps célestes* (Paris, 1870; German translation by Schellen, Brunswick, 1872); and *Dell' unità delle forze fisiche* (Rome, 1875; French translation, Paris, 1875).

SECKENDORF. I. Veit Ludwig von, a German scholar, born near Erlangen, Dec. 20, 1626, died in Halle, Dec. 18, 1692. In 1642 his father, Joachim Ludwig von Seckendorf, was executed for attempting to desert from the Swedish army, in which he was a colonel, and the son found a patron in Duke Ernest the Pious of Gotha. Shortly before his death the

elector Frederick III. of Brandenburg (the future king Frederick I. of Prussia), to whom he had dedicated his often republished *Fürstenstaat*, appointed him chancellor of the new university of Halle. The most celebrated of his works, *Commentarius Historicus et Apologeticus de Lutheranism* (3 vols., Leipsic, 1688-'92), was written in refutation of Maimbourg's *Histoire du Luthéranisme*. **II. Friedrich Heinrich**, count, a German soldier, nephew of the preceding, born at Königsberg, Franconia, July 5, 1673, died at Meuselwitz, near Altenburg, Nov. 23, 1763. In 1695 he entered the English and Dutch service, but afterward joined the imperial army and fought under Prince Eugene against the Turks and in the war of the Spanish succession. He subsequently became a major general in the army of Augustus II. of Poland and Saxony, and in 1713 was the Polish ambassador to the Hague in the conferences which led to the peace of Utrecht. After the fall of Stralsund in 1715 he reentered the imperial service, in 1719 became count of the empire, and in 1721 *Feldzeugmeister* and governor of Leipsic. Five years later he was sent as ambassador to Berlin by the emperor Charles VI., and in October, 1726, concluded the treaty of Wusterhausen. Subsequently he negotiated the marriage of the future Frederick the Great with the princess Elizabeth, for which the former never forgave him. In the war of the Polish succession he defeated the French at Klausen, Oct. 20, 1735. On the death of Prince Eugene in 1736, he received the command of the army against the Turks. In the campaign of 1737 Seckendorf's intentions were all thwarted by orders from the court of Vienna, and he was recalled and imprisoned for three years in the castle of Gratz. After his release he commanded the troops of the elector Charles Albert of Bavaria (crowned in 1742 as Charles VII. of Germany), with varying success, against Austria, and finally in 1744 recovered Munich for Charles. In April, 1745, he appeared at Füssen in what Carlyle calls "the questionable capacity" of negotiator of a peace with Austria, which caused his reinstatement in his dignities at Vienna, but gave umbrage to Frederick the Great, who had him imprisoned at Magdeburg on some slight pretext, and released after six months on his paying 10,000 thalers.

SECKER, Thomas, an English prelate, born at Sibthorpe, Nottinghamshire, in 1693, died in London, Aug. 3, 1768. He belonged to a family of nonconformists, and studied for the dissenting ministry, but became a physician. Subsequently he was induced to conform, and was ordained in 1723. He was distinguished as a preacher, and became bishop of Bristol in 1735 and of Oxford in 1737, and in 1758 archbishop of Canterbury. His works comprise sermons, lectures, and charges (last ed., with a memoir by Bishop Porteous, 6 vols., London, 1811).

SECOND, the 60th part of a minute, whether of an hour or of a degree. The minutes, being

the first divisions of these units, are called in the old mathematical treatises "primes," and were marked thus ', the seconds (*minutæ secundæ*) thus ". The next sexagesimal division was called thirds. The time divisions are now commonly marked m. and sec.

SECOND ADVENTISTS, or **Adventists**, a religious sect who believe in the speedy second advent of Christ and the end of the world. They owe their origin as a body in the United States to William Miller. (See MILLER, WILLIAM.) Under his preaching and that of some of his followers, the number of adherents rapidly increased. The time at which they at first expected the second appearing of Christ was October, 1842, and subsequently some of them have fixed upon different dates, among others 1843, 1847, 1848, 1857, and 1861. In 1840 Joshua V. Himes, one of their preachers, began the publication in Boston of a semi-monthly journal in advocacy of their views, called the "Signs of the Times and Exposition of Prophecy," and two years later changed it to a weekly, called the "Advent Herald," which had a very large circulation. The number of members continued to increase, notwithstanding the repeated errors into which they fell in regard to the date of the second advent. After the death of Mr. Miller (1849) there was some division in their views, a part holding to some modification of the usual Trinitarian view of the divinity of Christ, and some of them adopting the doctrine of the annihilation of the wicked; while the remainder adhered to the usual views of Trinitarians, except as to the second coming of Christ, which they believe will be speedy and pre-millennial, and that the first resurrection, that of the righteous, will then occur, while the wicked will not be raised till 1,000 years later; that during this thousand years he will reign on the earth, and while his reign will be a period of happiness for the righteous, it will be one of terror and judgment for the wicked. The Adventist churches are entirely independent, and generally receive their members by immersion on a profession of faith.—The "Advent Christian Association" is a body of Adventists who believe in the final destruction of the wicked. At the 16th annual meeting of this body, held at Springfield, Mass., in August, 1875, it was resolved, in order to complete the congregational form of government which has been adopted by the denomination, to convoke at once a general conference. The chief organ of this denomination is the "World's Crisis," edited by John Couch and Miles Grant. The "American Millennial Association," founded in Boston in 1858, is the centre of the "evangelical" Adventists, who do not believe in the final destruction of the wicked. Their principal organ is the "Messiah's Herald," published at Boston. The "Life and Advent Union" is another organization of Adventists believing in the annihilation of the wicked. Its organ is the "Herald of Life," published at Springfield, Mass.—Another branch

of Adventists observe the seventh day as the sabbath, and are called Seventh Day Adventists. They originated as early as 1844. They set no time for the coming of the Lord Jesus Christ, believing that the prophecies which, in the opinion of other Adventists, fix the second advent in or about the year 1844, really brought the world only to the "cleansing of the tabernacle," a period of brief but uncertain duration preceding the coming of Christ. One of the first organizers of this movement, Elder James White, began in 1850 the publication of the first organ of the Seventh Day Adventists, the "Advent Review and Herald of the Sabbath," which in 1855 was removed to Battle Creek, Mich., which place was henceforth the centre of all the denominational interests. The "Seventh Day Adventist Publishing Association" published in 1874, at Battle Creek, four denominational papers in English, one in Danish, and one in Swedish. Another English paper was established in California in 1874. The churches are organized into state conferences, of which in 1875 there were 13. A general conference, consisting of delegates, ministers, and laymen, meets annually. A mission has been established in Switzerland, where 200 believers were reported in 1875. The general conference of 1875 resolved to send missionaries as soon as possible to Great Britain, France, Germany, Holland, Italy, Hungary, Africa, and Australia. Strict temperance views, including the prohibition of the use of tobacco, prevail, and abstinence from pork, tea, and coffee is recommended. According to a report made to the general conference of 1875, the number of ministers was 69, of churches 339, and of members 8,022.

SECRETARY BIRD, a rapacious bird of the genus *serpentarius* (Cuv.) or *gypogeranus* (Ill.). The bill is moderate, broad, elevated at the base, and the culmen much arched to the hooked tip; nostrils with large and oblique lateral opening; wings long, with the third, fourth, and fifth quills nearly equal and longest, armed on the wrist joint with an obtuse spur; tail very long and wedge-shaped, with the two middle feathers prolonged; tarsi much lengthened, slender, covered in front with transverse scales; toes very short, the anterior ones united at base by a membrane, the hind one rather elevated, and all covered above with transverse scales; claws nearly straight and blunt; the lores and space round the eyes naked. The best known species is the *S. reptili-vorus* (Daud.; *gypogeranus serpentarius*, Ill.), about 3 ft. long, inhabiting the sandy plains of S. Africa; the general color is bluish gray, the quills, thighs, crest, and abdomen more or less marked with black; the throat and chest shaded with white, and lower tail coverts reddish; cere and naked parts yellow; it has a long erectile crest on the back of the head, looking when depressed like a pen behind a clerk's ear, whence the common name; it is also called serpent eater from its favorite food,

and messenger from its long steps and rapid gait. These birds are usually seen in pairs, and devour serpents and other reptiles; when attacking a serpent they approach with one



Secretary Bird (*Serpentarius reptilivorus*).

wing extended and acting as a shield to the body, and with the other strike the reptile, wounding it with the wing spur, tossing it into the air, and safely wearying out the most venomous species; they also eat lizards, tortoises, rats, small birds, and large insects. They run and hop very swiftly; they are very voracious, Le Vaillant mentioning that he took from the crop of one 11 good-sized lizards, 3 serpents as long as his arm, 11 small tortoises ("many of which were about 2 in. in diameter"), and a number of insects. They are often introduced, partly domesticated, into poultry yards to rid them of rats, snakes, and other animals which devour young birds or eggs, and they rarely attack the fowls while supplied with reptiles and meat. The nest is made on trees, and is large, built of sticks and lined with wool and feathers; they lay two or three eggs. This bird in its long tarsi resembles the waders, and has been placed among them by Vieillot, and among the *gallinæ* with the bustard by others on account of the wing spurs, terrestrial habits, and some details of internal structure. If a raptorial bird, as Nitzsch maintains, it comes nearer the vulture than the falcon family in the naked cheeks, loose plumage about the head, straightness and bluntness of the claws, and greater webs between the toes. A species is found in the Philippine islands, which is probably distinct from the African bird.

SECRETION. See GLAND.

SECTOR, in geometry, the portion of the area of a circle included between two radii and an arc. The instrument called by this name is used for solving mechanically numerous questions of proportions in geometry and trigonometry. It is called by the French the compass of proportion. It is made of two strips of

ivory, wood, or metal, each of them 6 in. or a foot long, and is hinged in the centre like a carpenter's rule. The pivot represents the centre of the circle, and the lines drawn from it upon the two limbs the radii. Upon these lines are drawn the several scales specially adapted to the sector. Other scales not directly belonging to it may be placed in the blank spaces on the limbs. The scales for the radial lines are selected and arranged according to the particular uses for which the instrument is intended. They commonly consist of a line of chords by which we may protract an angle of any number of degrees, find the degrees corresponding to any arc, &c.; a scale of equal parts, which affords the means when the limbs are opened to the proper extent of finding with a pair of dividers a third proportional to two given lines, or a fourth to three given lines, &c.; also lines of sines, secants, tangents, and polygons. The sector is a convenient instrument in plotting for giving without calculation angles and the lengths of required lines; but all instruments are necessarily imperfect, and since the introduction of logarithmic tables this one is little used.—An instrument called the astronomical or equatorial sector is used for taking the difference of right ascensions and declinations of stars; and the zenith sector is used in trigonometrical surveys to determine the zenith distances of stars whose declinations differ little from the latitude of the observer.

SECULAR GAMES, in Roman history, games celebrated at long and irregular intervals. Under the republic they were known as the Tarentine games from a place in the Campus Martius, called Tarentum, where they were celebrated, and appear to have been instituted about the time of the consul Valerius Publicola. Nothing is known of their origin beyond the fact that they were celebrated in honor of Pluto and Proserpine for the purpose of averting from the state some great calamity. Down to the time of Augustus they were held but three times; they were revived by that emperor in 17 B. C. with considerable pomp, occupying three days and nights, and being accompanied by sacrifices to Jupiter, Juno, and all the superior deities. For this occasion Horace wrote his *Carmen Sæculare*. The secular games were celebrated in the reign of Claudius in A. D. 47, in that of Domitian in 88, and in that of Philip in 248.

SECULARISM. See HOLYOAKE, GEORGE JACOB.

SECUNDUS, Johannes. See JOHANNES SECUNDUS.

SÉDAINE, Michel Jean, a French dramatist, born in Paris, July 4, 1719, died there, May 17, 1797. He was a stone cutter, but became known in 1756 by his comic opera *Le diable à quatre*, for which Philidor composed the music. Among his other pieces, set to music by Grétry and others, was *Richard Cœur de Lion* (1784). His best comedy, *Le philosophe sans le savoir* (1765), was revived in 1875, at the Théâtre Français.

SEDALIA, a town and the county seat of Pettis co., Missouri, on the Missouri Pacific railroad, at the junction of the Lexington branch, and the Missouri, Kansas, and Texas railroad, 189 m. by rail W. of St. Louis, 64 m. W. by N. of Jefferson City, and 94 m. E. S. E. of Kansas City; pop. in 1870, 4,560, of whom 845 were colored; in 1875, about 8,000. It was laid out in 1860, on one of the highest swells of a rolling prairie. The principal street is 120 ft. wide, is finely shaded, and has many handsome buildings. Sedalia is lighted with gas, and is supplied with water by the Holly system. It has a large and rapidly increasing trade. It contains the shops of the two railroad companies, several founderies and machine shops, flouring mills, and manufactories of agricultural implements, carriages, soap, and woollens. There are three hotels, two national banks, good public schools, a public library and reading room, three daily and four weekly newspapers, and 11 churches.

SEDAN (anc. *Sedanum*), a fortified town of France, in the department of Ardennes, on the right bank of the Meuse, 130 m. N. E. of Paris; pop. in 1872, 14,345. It has fine squares and promenades, a Protestant and three Catholic churches, and a château in which Turenne was born. Fine black cloths and cassimeres, linen, hosiery, leather, hardware, and firearms are manufactured. Sedan was formerly the capital of a principality, which in 1591 came into possession of the Turenne family, who in 1642 ceded it to France. It had a celebrated Protestant university, which was suppressed on the revocation of the edict of Nantes in 1685. The chairs commonly known as sedans took their name from this town. The fortress surrendered to the Hessians in 1815, and was occupied by the Prussians till November, 1816. Here the Germans, on Sept. 1, 1870, obtained a victory over the French, which led to the capitulation of the fortress, and the capture of Napoleon III. and his army. (See FRANCE, vol. vii., p. 397.)

SEDGE (A. S. *seeg* or *sæg*, a dagger, formerly applied to sharp-pointed plants in general which grew in marshes), a name for plants of the genus *Carex*, but sometimes applied in a general way to other plants of the *Cyperaceæ*, or sedge family, to which it belongs. There are about 200 species of the genus *Carex* in North America; they are found in great abundance in wet places (though some are met with only in dry localities and on the tops of mountains), where they form a large portion of the vegetation, and are often mistaken for grasses, from which they differ in several important particulars. The sedges are perennial, and, especially those in wet localities, often form dense tufts or tussocks; the culms or stems are triangular and solid; the leaves are grass-like, often rough on the margin and keel, with the sheaths (which in grasses are generally split down on one side) quite closed or entire;

at the upper portion of the stem are leafy or scale-like bracts, in the axils of which are borne the flower spikes, which are also terminal. The stamens and pistils are in separate



A Sedge (*Carex umbellata*), with separate Perigonium and Bract, Pistil, and section of Ovary.

flowers, either on the same spike (androgynous), or on separate spikes on the same plant (monocious), or rarely on distinct plants (dioecious). Both kinds of flowers are subtended by a scale-like bract, and these scales overlap one another equally around the axis to form a more or less cylindrical (sometimes ovoid) spike. The staminate flowers consist of three (rarely two) stamens to each bract; the pistillates have a single ovary and two or three long stigmas; the ovary is enclosed in a bag or sac with a narrow orifice from which the styles are protruded; this bag (*perigynium*) increases with the ripening fruit, and in some species becomes large and bladders; the fruit is a lens-shaped, plano-convex or triangular akene. The carices vary in height from a few inches to 3 ft. and over; in some the stems are weak and thread-like, and in others very wiry and rigid; they flower for the most part early in spring, and perfect their fruit during the summer. It is estimated that there are in all about 1,000 species, which are more abundant in arctic and cold countries, and diminish toward the tropics, where they are found only in the mountainous portions. While the species are numerous, the number of individuals is also very great, and in many places they form a large share of the vegetation; but they are of little direct value to man; their stems and foliage are dry and harsh, and contain very little sugar or starch; their chief office is to furnish mould for the sustenance of other plants. They can hardly be regarded as weeds, though some make their appearance in pastures which are too wet for the growth of nutritious grasses; the large tussocks which the sportsman and botanist

uses as "stepping stones" in crossing swamps are mostly produced by *C. striata*, in some of its several forms.—The sand sedge (*C. arena-ria*), common on the shores of Europe, has a slender but strong running and branching root stock, several feet long, which serves to bind the sands where it grows naturally, and is planted for the same purpose upon the dikes in Holland; the roots of this species have a reputation for diuretic and sudorific properties, and are known in Europe as German sarsaparilla. The Laplanders are said to convert the leaves of *C. sylvatica*, by drying and carding, into a sort of vegetable wool, which they use as a non-conductor of heat, to stuff their winter shoes. In some localities carices form a considerable part of the marsh hay which is cut for use as a mulch, and for bedding animals in the stable; when saturated with urine, it is thrown upon the manure heap and soon converted into a fertilizer. The carices, though regarded by novices in botany as difficult, have been favorite objects of study by some of the most eminent botanists. An important monograph on the American species was published by Schweinitz and Torrey in the "Annals of the New York Lyceum of Natural History" in 1824; later the species of the northern states were elaborated for Gray's "Manual of Botany" by John Carey; numerous papers on the genus by the late Dr. Chester Dewey are to be found running through the "American Journal of Science," in which the number of species is increased to an extent not accepted by other botanists; and Mr. S. T. Olney of Rhode Island has made important contributions to our knowledge of these plants. One of the finest monographs upon any specialty in botany is the "Illustrations of the Genus *Carex*," by Francis Boot (4 vols. fol., London, 1858-'67), with 600 plates.

SEDGWICK, a S. county of Kansas, intersected by the Arkansas river, and drained by the Little Arkansas and other affluents of that stream; area, 1,512 sq. m.; pop. in 1870, 1,095. The southwestern branch of the Atchison, Topeka, and Santa Fé railroad terminates at the county seat. The surface is undulating and the soil fertile. The chief productions in 1870 were 6,652 bushels of wheat, 1,100 of oats, 1,290 of potatoes, and 2,000 lbs. of wool. There were 407 horses, 760 cattle, 307 sheep, and 165 swine. Capital, Wichita.

SEDGWICK, Adam, an English geologist, born at Dent, Yorkshire, about 1785, died in Cambridge, Jan. 27, 1873. He graduated at Trinity college, Cambridge, in 1808, became a fellow of the college, and in 1818 succeeded Hailstone as professor of geology. He was elected a fellow of the royal society in 1819, and from 1829 to 1831 was president of the geological society. In 1827 he made a geological tour of Scotland, and in 1829, in conjunction with Murchison, visited different portions of Germany, Austria, and Switzerland, especially studying the Alps. In 1831 he commenced

a critical survey of the lower palæozoic strata of England and Wales. He first applied the term Cambrian to a series of rocks intermediate between the Silurian of Murchison and the subjacent crystalline schists and granites; and a bitter controversy arose between the two geologists respecting the use of the terms Cambrian and Silurian. (See GEOLOGY, and MURCHISON.) In 1834 Prof. Sedgwick became prebendary of Norwich. Besides numerous contributions to the transactions of societies, he published "Discourse on the Studies of the University of Cambridge" (1850), and "A Synopsis of the Classification of the Palæozoic Rocks" (1855). He was a strenuous opponent of the theory of evolution, and attacked Darwin's "Origin of Species." For detailed accounts of his researches, see "Memoirs of Sir Roderick I. Murchison," by Archibald Geikie (2 vols., London, 1874), and "Chemical and Geological Essays," by T. Sterry Hunt (Boston, 1875).

SEDGWICK, John, an American soldier, born in Cornwall, Conn., Sept. 13, 1813, killed at Spottsylvania Court House, Va., May 9, 1864. He graduated at West Point in 1837, was appointed second lieutenant in the second artillery, served in Florida, in the removal of the Cherokee nation, and on the northern frontier, and became first lieutenant in 1839. In the war with Mexico he was successively brevetted captain and major for gallantry at Contreras and Churubusco and at Chapultepec. In 1855 he was commissioned major in the first cavalry. He was made a brigadier general of volunteers on Aug. 31, 1861, received command of a division of the army of the Potomac in March, 1862, participated in the peninsular campaign, was wounded at Glendale, June 30, and was appointed major general of volunteers July 4. At the battle of Antietam, Sept. 17, he was severely wounded. On Dec. 22 he took command of the 9th army corps, and on Feb. 5, 1863, was transferred to the 6th corps of the army of the Potomac. He was in command at the storming of Marye's heights, near Fredericksburg, and in the final battle near Chancellorsville, May 3, 4; and in the Pennsylvania campaign he made a forced march of 35 m. to Gettysburg, where he commanded the left wing of the army in the battle of July 2, 3, and took part in the pursuit of the enemy to Warrenton. In the Rapidan campaign, September to December, he commanded the right wing, composed of the 5th and 6th corps, and was engaged in the combat of Rappahannock station, Nov. 7, and in the operations at Mine run, Nov. 26 to Dec. 3. In the Richmond campaign in May, 1864, he commanded the 6th corps, which had become known as Sedgwick's corps, and took part in the battle of the Wilderness, May 5, 6. Three days later, while making a personal reconnaissance, and directing the placing of a battery for the battle of Spottsylvania Court House, he was shot by a sharpshooter.

SEDGWICK. I. Theodore, an American statesman, born in Hartford, Conn., in May, 1746, died in Boston, Mass., Jan. 24, 1813. After a partial course at Yale college, he studied law, and in April, 1766, was admitted to the bar, and began practice at Sheffield, Berkshire co., Mass., which he represented several times in the legislature. In 1776 he served as aid to Gen. Thomas in the expedition to Canada. About the close of 1785 he removed to Stockbridge, and in that year and the next was a member of the continental congress. In the winter of 1787 he took a leading part in the suppression of Shays's rebellion. In 1788 he was a member of the Massachusetts convention which ratified the federal constitution, and speaker of the house of representatives of the state. He was a representative in congress from 1789 to 1796, and U. S. senator 1796-'9, and in 1799 again a representative and speaker of the house. In 1802 he was appointed to the bench of the supreme court of Massachusetts, where he remained till his death. Judge Sedgwick was an active member of the old federal party, and was ardently hostile to slavery. Shortly after the adoption of the Massachusetts constitution (1780), Elizabeth Freeman, a negro woman belonging to a Mr. Ashley of Sheffield, having fled in consequence of ill treatment, her master sued to regain his slave. She was defended by Mr. Sedgwick, and by the decision of the court pronounced free. This, it is believed, was the first fruit of the declaration in the Massachusetts bill of rights that "all men are born free and equal," and led to the extinction of slavery in that state.

II. Theodore, an American lawyer, eldest son of the preceding, born in Sheffield, Mass., Dec. 31, 1780, died in Pittsfield, Nov. 7, 1839. He graduated at Yale college in 1798, was admitted to the bar in 1801, and practised at Albany, N. Y., till 1821, when he retired to Stockbridge. He was a member of the state legislature in 1824, 1825, and 1827, and carried through a bill for a railroad across the mountains from Boston to Albany. He advocated free trade, temperance, and anti-slavery, and published "Hints to my Countrymen" (1826), and "Public and Private Economy, illustrated by Observations made in Europe in 1836-'7" (3 vols. 12mo, New York, 1838).—His wife, SUSAN RIDLEY (died 1867), was the author, among other works, of "The Morals of Pleasure" (1829); "The Young Emigrants" and "The Children's Week" (1830); "Allen Prescott" (1835); "Alida" (1844); and "Walter Thornley" (1859). **III. Catharine Maria**, an American authoress, daughter of Judge Theodore Sedgwick, born in Stockbridge, Mass., in 1789, died near Roxbury, July 31, 1867. She published "The New England Tale" anonymously in 1822, and it had an immediate and wide popularity. In 1824 she published "Redwood," which was republished in England, and translated into French, Italian, German, and Swedish. Her subsequent publications in-

clude "Hope Leslie, or Early Times in America" (1827); "Clarence, or a Tale of our own Times" (1830); "Le Bossu," a story for the young (1832); "The Linwoods," a romance of the revolution, and a collection of tales (1835); a series of juveniles, including "The Poor Rich Man and Rich Poor Man," "Live and Let Live," "Means and Ends," "Home," and "Love Token for Children" (1836-'9); the life of Lucretia Maria Davidson, in Sparks's "American Biography" (1837); "Letters from Abroad to Kindred at Home," after a visit to Europe (1841); "Wilton Harvey, and other Tales" (1845); and "Married or Single?" (1857).—See "Life and Letters of Miss Sedgwick," edited by Mary E. Dewey (New York, 1871). **IV. Theodore**, an American lawyer, son of Theodore Sedgwick, 2d, born in Albany, N. Y., Jan. 27, 1811, died in Stockbridge, Mass., Dec. 9, 1859. He graduated at Columbia college, New York, in 1829, and was admitted to the bar in May, 1833. The next 15 months he passed in Europe, chiefly at Paris, where he was attached to the legation of Edward Livingston. On his return home he commenced practice in New York, which he prosecuted with great industry and success till about 1850. He published a memoir of William Livingston (1833); "Treatise on the Measure of Damages, or an Inquiry into the Principles which govern the Amount of Compensation recovered in Suits at Law" (1847; 5th ed., 1869); and a "Treatise on the Rules which govern the Interpretation and Application of Statutory and Constitutional Law" (1857). In January, 1858, he was appointed United States attorney for the southern district of New York. He edited the political writings of William Leggett (2 vols. 8vo, New York, 1840).

SEDELEY, Sir Charles, an English poet, born at Aylesford, Kent, in 1639, died Aug. 20, 1701. He was the son of Sir John Sedley, and after the restoration went to London, where according to Wood he set up for a satirical wit. He soon obtained great favor with Charles II., and his private fortune was wasted in debauchery. He was once engaged in a riot at a public house, where he made a speech to the mob, naked, from the balcony, and was fined £500. He now applied himself to serious business, and distinguished himself in parliament by his opposition to James II. His activity in bringing about the revolution is attributed to the king's intrigue with his daughter, who became his mistress and was created countess of Dorchester. His collected works, consisting of short amatory poems, parliamentary speeches, plays, and some translations from the classics, were published with a memoir in 1722.

SEDUCTION, the persuading a woman to surrender her chastity. It has been often made a reproach to the common law that it does not regard the seducer as a criminal, or at least hold him to a direct responsibility. The French and Prussian codes also, composed as they have

been by the deliberate act of the lawgivers, though, like the Roman laws, they throw the strongest defences against violence around the chastity of women, yet denounce no penalties against the mere seducer. But though the common law does not hold the seducer to any direct responsibility, yet indirectly it does reach him. The seducer who renders a female servant incapable of her usual labor and service is bound to make indemnity. This is the principle and basis of almost all suits for seduction; they are actions on the case, and rest immediately on the loss of service consequent upon the seduction. By a fiction of the law the relation of master and servant is conceived to exist between parent and child, and thus a father may have an action for the seduction of his daughter. The father may also found his suit on the seducer's illegal entry upon his premises, and may then state the seduction and loss of service in aggravation. But it is essential to this mode of proceeding that the daughter lived with the father at the time of the seduction, or, if away, was subject to recall at his will; and it is therefore inapplicable to very many cases. In the more usual form to which we have referred, namely, of case, the consequential injury being the ground of action, it is unimportant whether the seduced lived with the father at the time of the seduction or not.—It is now the general rule that exemplary or punitive damages are properly given in such a case, and the amount of them is very much in the discretion of the jury. One of the earliest cases in which such damages are recommended by the court is a case of the year 1800, in which Lord Eldon, at that time chief justice of the common pleas, told the jury they were to regard not merely the loss of service but the wounded feelings of the parent. In 1805 Lord Ellenborough said that redress was to be given to the father not only for his loss of the society and comfort of his child, but also for the dishonor which he received; and in 1811 that, though it was difficult to conceive on what legal principle the damages could be extended beyond the injury resulting from loss of services, yet the practice was now inveterate and could not be shaken, and that the feelings of parents and of those who stood *in loco parentis* were always to be taken into consideration. In all cases then, if the suit is at the common law, however the damages may be increased by other considerations, some loss of service must always be alleged in the declaration, and proved. The English law requires that the actual relation of master and servant shall have existed between the plaintiff and the person seduced at the time of the seduction; so that where a daughter under age was seduced by her master, while living in service away from her father's house with his consent, and with no intention of returning to it, the father was held to have no ground of action. The rule is not so strict in the United States; and in a leading case in New York, where a daughter

under age, with the consent of her father, lived with her uncle, who agreed to pay her for such work as she chose to do, but made no agreement with her for any fixed time of service, and while in her uncle's house she was seduced and returned to the house of her father, who paid the expense attending her confinement, it was held that, as the father had made no contract binding out his daughter, he could still control her services; the fact that the daughter had no intention of returning could not affect the father's right; she was his servant *de jure*; and as the defendant had done an act which deprived the father of services that he had the right to exact, he must respond in damages.—The father's legal right to the services of his daughter extends to her majority, which at the common law is the age of 21 years. If she is living with her father during her minority, proof of this fact alone suffices to maintain the issue in respect to the fact of service; service is presumed. If the daughter is already of full age, there must be proof of service in fact rendered to the father. Proof of very slight service suffices, if she is still living with him; but if she is absent from home under a contract made by herself since attaining her majority, the father has no right of suit. His action, however, will not be defeated if the defendant hired the daughter for the purpose of getting her into his possession and out of the father's control, even though she were of full age at the time of the hiring, provided she were then living in her father's family. The hiring being fraudulent and therefore null, the relation of master and servant was never contracted between the daughter and her seducer, and so was never interrupted as between her and her father.—The action may be maintained by any one who stands *in loco parentis*, by a guardian, for example, or by a relative who has adopted the female as his own child, in the same cases and under the same conditions that give a cause of action to the natural parent. A mother cannot maintain an action for the seduction of her daughter during the father's life, though the child be not born until after the father's death. There must be an actual or constructive right to the daughter's service at the time the injury is committed, that is to say, at the time of the seduction. If the relation of master and servant first arises after the injury has been done, there is no ground to claim indemnity for the resulting loss of service.—Upon the trial of the cause, the fact of the seduction may be proved by the woman herself. Her general character for chastity is considered to be in issue, and may be impeached by general evidence on the part of the defendant, and be supported by the plaintiff in like manner. But though the evidence discloses the woman's previous criminality with others, it will avail nothing if the jury are satisfied that the defendant is the father of her child, and so the cause of the plaintiff's loss of service. It has been held that if an attempt

be made by the defendant to destroy on trial the good character of the seduced woman, and this attempt be defeated, the making the attempt may be regarded by the jury in estimating damages; and so indeed may all circumstances which aggravate the seduction, and increase the harm caused by it.—Recent statutes have made great inroads on the common law of seduction in several of the states. The action is allowed to be brought by the father or other near relative, irrespective of any question of the right to service, and in some states even by the woman herself. It is also in some of the states made a felony. The terms in which the offence is described differ in different statutes, some providing for the punishment of any man who shall "seduce and debauch any unmarried woman," while others make a promise of marriage an essential element of the seduction. In respect to the promise of marriage, it has been held not necessary to aver a mutual or valid promise. It is therefore immaterial that the seducer is a married man, provided the woman was ignorant of it.

SEDUM (Lat. *sedere*, to sit, in allusion to the manner in which some of the plants are attached to rocks), the name of a genus of plants some of which are known as orpine, stonecrop, and live-for-ever, while the botanical name is in common use for the ornamental species. It belongs to the family *crassulaceæ* with several other genera of mostly succulent plants, one of which, *sempervivum*, is described under HOUSELEEK. The sedums include annual and perennial plants of very variable habit; some are low and creep along the ground, forming moss-like tufts, while others are erect, and a few are somewhat woody; the leaves are fleshy, and variable in shape, being cylindrical and linear, or flat and broad, and both opposite and alternate; the flowers, mostly in cymes, are white, yellow, and rose-colored; the petals, sepals, and pistils are four or five, and the stamens twice that number, the mostly distinct ovaries ripening into many-seeded pods. About six species are indigenous to the Atlantic states, and two have been introduced



Live-for-ever (*Sedum telephium*).

from Europe, one of which, *S. telephium*, the live-for-ever, has long been a garden plant, and has become naturalized as a troublesome weed in various parts of the country. Its strong

stems form a dense clump 2 ft. high; the large oval leaves are toothed on the margins; the flowers are pale purple in a dense terminal cluster, and appear in July. This, like many others of the species, is very tenacious of life; a stem cut and pinned up against the wall will continue to grow, and even flower, at the expense of the nutriment contained in the lower leaves and the base of the stem; it is often called Aaron's rod, and in England it is known as midsummer-men; the country girls on midsummer's eve set up two stems of it, one for themselves and the other for their lover; the fidelity of the lover is estimated by his plant turning to theirs. In Europe it has a reputation as a remedy for diarrhœa, being mucilaginous and slightly astringent.—Stonecrop



Stonecrop (*Sedum acre*).

(*S. acre*) naturally grows upon rocks and walls; it is a low moss-like species, forming a dense mat of light green, and producing numerous yellow flowers in July. It has long been cultivated, and is sometimes used for edgings, and often to cover the earth in flower vases, hanging baskets, and the like; it has also become naturalized. It is exceedingly acrid to the taste, and one of its common names in England is wall pepper; it is emetic and cathartic in large doses, and if the bruised leaves be kept long in contact with the skin a blister will be produced.—Among the native species is *S. ternatum*, with low spreading stems, flat wedge-shaped leaves, and ternate or three-spiked cymes of white flowers, is found from Pennsylvania south and westward, and is often cultivated. The showiest native species, properly named *S. pulchellum*, as it is one of the handsomest of the genus, is a more southern plant; its stems, often a foot high, are crowded with linear cylindrical leaves, and at the top bear a broad cyme, the spikes of which are arranged in a very regular manner, and bear a profusion of rose-purple flowers; it is now and then cultivated, and in some localities is known as the widow's cross. Rose-root (*S. rhodiola*) is a dioecious species with greenish yellow and purplish flowers, and a rose-scented root; it grows sparingly in Pennsylvania, but is plenty on the extreme

eastern coast. Several sedums are peculiar to the far west and the Pacific coast. About 125 species in all are enumerated, some being only of botanical interest, while several are prized in cultivation. One, under the name of *S. carneum variegatum*, is a popular garden



Sedum Sieboldii.

plant; it is of low growth and has its small leaves edged with white; nothing is known of its origin, and it has not produced flowers.—The Japan sedum, *S. spectabile* (called in the catalogues *S. Fabaria*) is a fine species, 12 to 18 in. high, with rose-purple flowers in dense cymes, which are 6 in. across; it is especially valuable on account of blooming in September, when flowers of delicate tints are scarce. Another Japanese species is Siebold's sedum (*S. Sieboldii*), with slender stems, which soon become prostrate, and nearly round leaves in whorls of three,

of a fine glaucous green; the terminal cymes of pink or purplish flowers open in October; there is a variegated form in which the leaves are distinctly marked with yellowish white; though perfectly hardy, both the plain and the variegated forms are seen to much better advantage if grown as house plants, in a hanging pot or a vase. The sedums are easily multiplied by dividing the clump or making cuttings of the stems.

SEEBACH, Marie, a German actress, born in Riga, Feb. 24, 1835. She is the daughter of an actor, and was educated at Cologne for the opera. After appearing in minor parts in Nuremberg and Cassel, chiefly in vaudevilles, she became celebrated by her personation of Margaret in Goethe's *Faust* and of Clärchen in *Egmont* in Hamburg, Munich, Vienna, and Hanover. She performed chiefly at Hanover from 1856 to 1865, when she and her husband, the tenor singer Albert Niemann, removed to Berlin. She was afterward divorced, and in 1870-'71 made a tour of the United States.

SEELAND (Dan. *Spølland*), an island of Denmark, bounded N. by the Cattegat, separated E. by the Sound from Sweden, S. by the Baltic from the islands of Möen, Falster, and Laaland, and W. by the Great Belt and its continuations from Langeland, Fünen, and Samsø; length 81 m., greatest breadth 66 m.; area, 2,721 sq. m.; pop. in 1870, 560,510. It is irregular in shape and much indented by arms of the Baltic, and in the north an arm of the Cattegat extends far into the interior. The surface is generally flat. The soil is an extremely fertile alluvium resting on beds of

mussel shells and corallines. The chief product is grain. Extensive forests once covered the island, but timber is now scarce. The climate is humid and milder than in other places in the same latitude. Frederiksborg, the new part of the city of Copenhagen, stands on this island, which together with Möen and Samsø forms one of the main divisions of Denmark.

SEELEY, John Robert, an English author, born in London about 1834. He is the son of a London publisher. He graduated at Christ Church, Cambridge, of which he became a fellow in 1858, was for several years principal classical assistant at the city of London school, was appointed in 1863 professor of Latin in University college, London, and in 1869 was made professor of modern history at Cambridge. In 1865 he published anonymously "Ecce Homo: The Life and Work of Jesus Christ." He has also published "Classical Studies, as an Introduction to the Moral Sciences" (1864); "An English Primer, or Course of English Instruction for Schools," with E. A. Abbott (1869; Boston ed., "English Lessons for English People"); "Roman Imperialism" (Boston, 1869); "Lectures and Essays" (1870); and an edition of Livy.

SEELYE, Julius Hawtrey. See supplement.

SEEMANN, Berthold, a German naturalist, born in Hanover, Feb. 28, 1825, died in Nicaragua, Oct. 10, 1871. In 1846 he was appointed naturalist to an English expedition around the world, which returned to London in 1851. He explored the Feejee islands in 1860, and purchased a gold and silver mine in Nicaragua. His principal works are: "Narrative of the Voyage of H. M. S. Herald, and three Cruises to the Arctic Regions in search of Sir John Franklin" (London, 1852; German, 2 vols., Hanover, 1853); "Botanical Researches" (London, 1852-'7); "Popular History of the Palms" (1856); "Viti, an Account of a Government Mission to the Vitian or Fijian Islands" (1862); and "Dottings of the Roadside" (1868).

SEGNERI, Paolo, an Italian orator, born at Nettuno in the Roman Campagna, March 21, 1624, died in Rome, Dec. 9, 1694. He early joined the order of Jesus, and labored as a missionary in Italy from 1665 to 1692, when he was appointed by Innocent XII. preacher to the papal court. His principal works are: a course of Lenten sermons entitled *Il Quarosimale* (fol., Florence, 1679; 4to, Rome, 1752; 3 vols. 8vo, Padua, 1826); *Il Cristiano istruito* (3 vols. 4to, Florence, 1686; French translation, 5 vols., Avignon, 1836); *Il incredulo senza scusa* (Florence, 1690); *Panegirici sagri* (Venice, 1692); and *Prediche dette nel palazzo apostolico* (4to, Rome, 1694). Complete editions were published at Venice (4 vols. 4to, 1712, 1758), Parma (3 vols. fol., 1714, with a life by Maffei), and Milan (3 vols. 8vo, 1837-'8).

SEGOVIA. I. A central province of Spain, in Old Castile, bordering on Valladolid, Burgos, Soria, Guadalajara, Madrid, and Ávila; area, 2,714 sq. m.; pop. in 1870, 150,812.

The S. E. portion is mountainous, being bordered by the Guadarrama chain, and the remainder in general level. It is watered by the Eresma and several other tributaries of the Douro. Some fine marbles are quarried, besides large quantities of limestone, chalk, and granite. The climate is generally cold, and the soil is very fertile. The vine and other fruits are extensively cultivated. The mountainous region contains important pine forests and rich pastures. The manufactures, once flourishing, are now limited to cloth, glass, paper, and wines and brandies, on a small scale. **II.** A fortified city, capital of the province, on the Eresma, 43 m. N. W. of Madrid; pop. about 12,000. It stands on a rocky ridge, occupies two hills and a valley, and is surrounded by dilapidated walls with round towers and seven gates. The streets are tortuous and narrow, lined with lofty and generally antique houses. There are a Gothic cathedral, a handsome mint erected in the 15th century, and five old bridges; but Segovia is chiefly famous for its ancient *alcázar* or Moorish castle, used as the treasury building down to 1730, and since as a school of artillery;



The Alcázar of Segovia.

and for its magnificent aqueduct, attributed to Trajan, with 160 arches in double tiers, three of which are 100 ft. high. The woollen manufactures, once employing 30,000 hands, are now comparatively insignificant. Wool is the staple article of export.—Segovia was found-

ed before the invasion of the Romans, by whom, as well as by the Goths and Arabs, it was embellished. It was occupied by the French from 1808 to 1814.

SEGUIN, Édouard, a French physician, born at Clamecy, department of Nièvre, Jan. 20, 1812. He was educated at the colleges of Auxerre and St. Louis in Paris, studied medicine and surgery, and devoted himself to the treatment of idiots. After the revolution of 1848 he settled in Ohio. In 1860 he revisited his native country, and has since lived in New York. Since 1866 he has done much for the study of animal heat by his publications, new instruments, and methods of thermography. He represented the United States as commissioner on education at the Vienna exhibition in 1873. His works are: *Résumé de ce que nous avons fait pendant quatorze mois*, with Esquirol (Paris, 1839); *Conseils à M. O. sur l'éducation de son enfant idiot* (1839); *Théorie et pratique de l'éducation des idiots* (two parts, 1841-'2); *Hygiène et éducation* (1843); *Images graduées à l'usage des enfants arriérés et idiots* (1846); *Traitement moral, hygiène et éducation des idiots, et des autres enfants arriérés* (1846), the standard authority on the subject; *J. R. Péreire, analyse raisonnée de sa méthode* (1847); *Jacob Rodrigue Péreire, notice sur sa vie et ses travaux* (1847); "Origin of the Treatment and Training of Idiots" (Hartford, 1856); "Idiocy, its Diagnosis and Treatment by the Physiological Method" (Albany, 1864); "Idiocy and its Treatment by the Physiological Method" (New York, 1866); "New Facts and Remarks concerning Idiocy" (1870); "Prescription and Clinic Record" (1870); "Medical Thermometry," with C. A. Wunderlich (1871); "Clinical Charts" (1872); "Thermometry in the Family" (1872); "Manual of Thermometry for Mothers" (1873); *Thermomètres physiologiques, &c.* (Paris, 1873); *Tableaux de thermométrie mathématiques* (1873); and part of his report on education at Vienna (1875). (See IDIOCY.)

SÉGUR. I. Philippe Henri, marquis de, a French soldier, born Jan. 20, 1724, died in Paris, Oct. 8, 1801. He distinguished himself in various battles in 1746-'7, was wounded, and lost an arm; took an active part in the seven years' war, and was finally made prisoner at Closter-camp. In 1763 he was appointed inspector general of infantry, in 1780 minister of war, and in 1783 a marshal. He resigned his office in 1787. During the reign of terror he was imprisoned and lost all his property. Napoleon gave him in 1800 a pension of 4,000 francs. **II. Louis Philippe**, count, a French historian, son of the preceding, born in Paris, Dec. 10, 1753, died there, Aug. 27, 1830. He served under Rochambeau in America in 1782, was appointed ambassador to St. Petersburg in 1784, and was a favorite of Catharine II. He afterward became a brigadier general and ambassador to Berlin, and in 1812 a member of the senate. Under the first restoration he was

a peer, but he rejoined the emperor during the hundred days, and in vain sought to share his exile. His complete works (33 vols., 1824-'30) are chiefly historical, but include plays which he wrote for the Russian empress, under the title *Théâtre de l'Hermitage* (2 vols., 1798), and his *Mémoires, ou souvenirs et anecdotes* (3 vols., 1824; English translation, Boston, 1825). **III. Philippe Paul de**, count, a French historian, son of the preceding, born in Paris, Nov. 4, 1780, died there, Feb. 25, 1873. He entered the army in 1800, became a favorite of Napoleon, who employed him on confidential missions, and for some time was a prisoner of war in Russia. In 1812 he accompanied the emperor in the Russian campaign as his aide-de-camp; and in 1813 he was instrumental in saving the French army at Hanau. Under the first restoration he accepted a commission from Louis XVIII., but joined Napoleon during the hundred days, and was only nominally restored to his rank in 1818. In 1831 Louis Philippe appointed him lieutenant general and peer. His works include *Histoire de Napoléon et de la grande armée pendant l'année 1812* (2 vols., 1824), which involved him in many controversies and in a duel with Gen. Gourgaud; *Histoire de Russie et de Pierre le Grand* (1829); and *Histoire de Charles VIII.* (2 vols., 1834; 2d ed., 1842; English translation, 2 vols., Philadelphia, 1842), a continuation of his father's *Histoire de France*.

SEIDLITZ POWDERS. See ROCHELLE SALT.

SEIDLITZ WATER, the product of certain saline springs in Seidlitz or Sedlitz, a village of Bohemia near Bilin, used as an agreeable and effective aperient. The solid contents in a wine pint, according to Bergman, are 192.8 grains, consisting of sulphate of magnesia, 180 grains; sulphate of lime, 5; chloride of magnesium, 4.5; carbonate of magnesia, 2.5; carbonate of lime, 0.8. To prepare an artificial Seidlitz water, dissolve from $\frac{3}{4}$ to $1\frac{1}{2}$ oz. of sulphate of magnesia in three times its weight of water, and, after filtering, introduce it into a bottle, to be filled with water charged with carbonic acid gas.

SEINE (anc. *Sequana*), a river of France, rising in the department of Côte-d'Or, on the slope of Mt. Tasselot, flowing first N. W., then W. S. W., and again N. W., through the departments of Aube, Seine-et-Marne, Seine-et-Oise, Seine, Eure, and Seine-Inférieure, and falling into the English channel between Havre and Honfleur. The direct distance from its source to its mouth is 250 m., but its windings make it nearly 500 m. long. It is navigable for large vessels to Rouen, and for small vessels 250 m. to Méry-sur-Seine. It is connected by canals with the Loire, the Saône and Rhône, the Somme and Scheldt, and the Ourcq. Its elevation at its source is about 1,500 ft. above the sea. At Paris its width is from 300 to 500 ft., and at its embouchure about 7 m. Its chief tributaries on the right are the Aube, Marne, and Oise, and on the left the Yonne,

Loing, Essonne, Eure, and Rille. The principal towns on its banks are Châtillon, Bar-sur-Seine, Troyes, Nogent, Melun, Paris, Poissy, Mantes, Rouen, and Havre.

SEINE, the metropolitan department of France, in the old province of Île-de-France, entirely enclosed by the department of Seine-et-Oise; area, 183 sq. m.; pop. in 1872, 2,220,060. It is divided into the arrondissements of Paris, St. Denis, and Sceaux, the first of which is coterminous with the city of Paris. The surface is generally level. The Seine flows through the department very circuitously from S. E. to N. W., and the Marne joins it from the eastward. The most valuable mineral productions are excellent building stone and gypsum, producing plaster of Paris. The soil is fertile, and cultivated with great care. Capital, Paris.

SEINE-ET-MARNE, a N. department of France, in the old province of Île-de-France, bordering on the departments of Oise, Aisne, Marne, Aube, Yonne, Loiret, and Seine-et-Oise; area, 2,215 sq. m.; pop. in 1872, 341,490. The surface is undulating, and has many extensive plains. The Seine and the Marne flow through it. It contains sandstone, fine millstones, and potter's clay. The soil is rich and well cultivated. It is divided into the arrondissements of Melun, Meaux, Fontainebleau, Coulommiers, and Provins. Capital, Melun.

SEINE-ET-OISE, a N. department of France, in the old province of Île-de-France, bordering on the departments of Oise, Seine-et-Marne, Loiret, Eure-et-Loir, and Eure, and enclosing the department of Seine; area, 2,164 sq. m.; pop. in 1872, 580,180. The surface is diversified, but there are no high hills. The Seine flows through it, and is here joined by the Oise from the northeast. Millstones, sandstone, paving stone, gypsum, chalk, and potters' clay are found; and there are sulphur springs. The soil is not naturally very fertile, but it is carefully cultivated. The manufactures include cloth, hosiery, paper, firearms, and Sèvres porcelain, the last, which is conducted by the government, being the most important. It is divided into the arrondissements of Versailles, Rambouillet, Corbeil, Mantes, Étampes, and Pontoise. Capital, Versailles.

SEINE-INFÉRIEURE, a N. W. department of France, in Normandy, bounded N. W. by the English channel, E. by the departments of Somme and Oise, and S. by Eure and the embouchure of the Seine; area, 2,330 sq. m.; pop. in 1872, 790,022. It has a generally low surface, the coast being skirted by chalk cliffs of no considerable elevation except near Fécamp, where they are about 700 ft. high, and it is traversed from E. to W. by a low offshoot of the Ardennes. It is watered by the Seine in the southern districts, and by the Bresle, Yères, and Arques in the northeastern. Cotton, linen, cloth, lace, silks, and watch and clock movements are manufactured, and there

are machine works and ship yards. It has important fisheries. It is divided into the arrondissements of Rouen, Havre, Dieppe, Yvetot, and Neufchâtel. Capital, Rouen.

SEISIN. See LIVERY OF SEISIN.

SEISTAN (anc. *Sacastane*, the country of the *Sacæ*), a province in the S. W. part of Afghanistan, with an adjoining part included in Persia. It is between lat. 30° and 32° N., and lon. 61° and 63° E., in the lower basin of the river Helmund. The lake of Seistan, or Hamoon (in its S. W. part known as Lake Zurrah or Zirreh), into which flow the Helmund from the south, the Khash-rud from the east, and the Furrah-rud and the Harut from the north, is a low and swampy expanse from 15 to 30 m. wide, and nearly 200 m. long from N. to S., mainly between the 61st and 62d meridians. A great part of this depressed area, partly included in Persia and Beloochistan, is now dry, though subject to inundation. In the north, near lat. $31^{\circ} 30'$, it is occupied by two shallow and reedy lakes, about 15 m. apart, each of which is also called Hamoon. Seistan proper is a well watered and fertile alluvial plain of sand and clay W. of the Helmund in the lower part of its northward course, bounded S. by the main irrigation canal, and N. and W. by the Hamoon; estimated area, 947 sq. m.; pop. about 45,000, of whom 20,000 are Seistanis, the purest type of Aryan Persians, and 10,000 nomadic Beloochees. The Afghans are few, but politically powerful. Wheat, barley, and melons are produced abundantly, with some cotton, peas, beans, and oil-seeds. Snow rarely falls, but the winters are windy and the mercury sinks to 5° F., rising above 90° in spring and summer. Traces of an elaborate civilization abound, and among the numerous ruins those of Zaranj, the ancient capital as the Arab writers call it, are the most celebrated. The principal existing towns are in the district watered by the main canal; among them is Sekuha, the modern capital. Outer Seistan is 30 m. wide, and extends from the mouth of the Helmund about 120 m. S. along the right or E. bank. It also includes a plain about 80 m. long and 40 m. broad, stretching southward from Seistan proper. The only important town is Charkansur, S. of the Khash-rud, containing a fort and 150 houses.—Seistan was in antiquity a part of Drangiana or Zarangia. It is believed that the Aria Palus of Ptolemy was the lake of Seistan. Some time before the Christian era it was overrun by Scythian hordes, of which the paramount tribe were the *Sacæ*, who gave their name to the country. The Scythians were overcome at the time of the Arab invasion, and Seistan afterward became a province of Persia. It now belongs mainly to Afghanistan. In 1871 an arbitration commission under Sir F. J. Goldsmid fixed the boundary so as to give Persia nearly all of Seistan proper.

SEJANUS, *Lucius Ælius*, a Roman conspirator, born at Volsinii in Etruria, put to death A. D.

31. He was first attached to the interests of the infant Caius Cæsar (Caligula), the son of Germanicus, but shortly after the accession of Tiberius was appointed to the command of the prætorian guard in conjunction with his father, Seius Strabo, who had held the post under Augustus; and when his father became governor of Egypt, the sole command of the prætorian cohort devolved upon Sejanus. As his popularity with the guard increased he aspired to the imperial power. To remove Drusus, the heir of Tiberius, he caused his wife Livia or Livilla to poison him, promising to marry her afterward. He procured the banishment of Nero and Drusus, the sons of Germanicus, and of their mother Agrippina. His wife Apicata had been divorced soon after the death of Drusus, but Tiberius refused to consent to his marriage with Livia. In 26 he induced Tiberius to reside permanently in the island of Capræa, and give himself up to a life of sensual pleasure, and for nearly five years Sejanus acted and was recognized as the representative of the emperor. He was about to hasten the development of his plan when Tiberius, being informed of it, gave the command of the prætorian guard to Nervius Sertorius Macro, and had the death of Sejanus decreed by the senate. He was strangled, and his body was torn to pieces by the populace.

SEJOUR, *Victor*, a French dramatist, born in Paris in 1816, died there, Sept. 20, 1874. His first drama, *Diégarais*, was performed at the Théâtre Français in 1844, and he wrote plays for the Porte Saint-Martin, Odéon, Ambigu, and Gaité theatres, including *Richard III.* (1852), *Les noces vénitienues* (1855), *André Gérard* (for Lemaître's farewell performances, 1857), and *Les fils de Charles Quint* (1864).

SELACHIANS (Gr. *σέλαχος*, a cartilaginous fish), a name applied from Aristotle to the present day to the families of cartilaginous fishes with fixed branchiæ, comprising the rays and sharks, also called plagiostomes. (See **PLAGIOSTOMES**.)

SELBORNE, *Lord*. See **PALMER**, **ROUNDELL**.

SELDEN, *John*, an English author, born at Salvington, Sussex, Dec. 16, 1584, died in London, Nov. 30, 1654. He was educated at Oxford, was called to the bar, and became known as "the great dictator of learning of the English nation." He was a member of Ben Jonson's Literary club. His earliest work, the *Analecton Anglo-Britannicon* (1615), was written in 1606. He also published "England's Epinomis," *Jani Anglorum Facies Altera*, and "The Duel or Single Combat" (1610), law treatises; "Titles of Honor" (1614); *De Diis Syris* (1617); and "History of Tithes" (1618). In the last named work he denied the divine right of the clergy to receive tithes, and was obliged to make a public acknowledgment of his regret at having promulgated his opinions, which however he was careful not to retract. In 1621 he underwent a brief imprisonment for advising the commons to insist upon certain privileges in dispute between themselves and

the crown; and in 1625, being then a member of parliament, he took part against the royal favorite, the duke of Buckingham, whom in the succeeding parliament he aided in impeaching. From 1629 to 1634 he was imprisoned in the tower on a charge of sedition. He had meanwhile produced a variety of works, including his *Marmora Arundeliana* (1628). In 1635 appeared his *Mare Clausum*, in answer to the *Mare Liberum* of Grotius. In the long parliament, to which he was elected in 1640 for the university of Oxford, he frequently sided with the king. He opposed the exclusion of the bishops from the house of peers, and also the condemnation of Strafford, although he was one of the members named to prepare the articles against him. Subsequently he was keeper of the records in the tower, and having subscribed the "Solemn League and Covenant," he was appointed in 1644 one of the 12 commissioners chosen commissioners to the admiralty. When it became apparent that the struggle between the crown and the commons could have no peaceful issue, he gradually withdrew from political life. He died at the house of the countess of Kent, to whom he is said to have been married. He is now best known by his "Table Talk," published in 1689 by Richard Milward, his amanuensis. A complete edition of his works, with a memoir by David Wilkins, appeared in 1726 (6 vols. fol.).

SELENE. See LUNA.

SELENITE. See GYPSUM.

SELENIUM, an elementary substance discovered by Berzelius in 1817 in the refuse of a sulphuric acid manufactory near Fahlun. It resembles sulphur in many of its physical, and tellurium in many of its chemical characteristics. It is always found in combination, its compounds with the metals being called selenides, and they are very rare, the least rare being the selenides of iron, copper, and silver. The symbol of selenium is Se; its atomic weight, 79.5; its specific gravity when crystallized, 4.788; its observed vapor specific gravity at 2,588° F., 5.68. When heated as an amorphous powder to 212° it softens, and when raised a few degrees higher it melts, and on cooling forms a dark brown vitreous solid with a metallic lustre and a specific gravity varying from 4.3 to 4.8. Selenium has neither taste nor smell, and is a bad conductor of electricity. It combines with hydrogen to form seleniuretted hydrogen, which has an offensive odor. The gas is obtained by the action of sulphuric acid on selenide of potassium or iron. Selenium forms with oxygen and water selenious acid, H_2SeO_3 , and selenic acid, H_2SeO_4 , which correspond in composition to sulphurous and sulphuric acids (see SULPHUR), and form salts called respectively selenites and seleniates.

SELEUCIA, the name of numerous ancient cities of Asia, situated in Assyria, Margiana, Syria, Mesopotamia, Cilicia, Pamphylia, Pisidia, Caria, and other countries. **I. Seleucia on the Tigris** was founded by Seleucus I. of Syria,

on the right bank of that river, near its junction with the royal canal of Babylonia, and opposite the mouth of the Delas (now Diala) river, a little S. of the modern city of Bagdad. Commanding the plains of the Tigris and Euphrates, and the principal caravan roads of Assyria and Babylonia, and peopled by settlers from various countries of western Asia, it rapidly rose in wealth and splendor, eclipsing Babylon, until it was in its turn eclipsed by Ctesiphon, built by the Parthians on the opposite bank. The later wars of the Romans against that people proved destructive to Seleucia. It had more than half a million inhabitants in the 1st century, in the 2d was burned by Trajan and Lucius Aurelius Verus, and captured by Septimius Severus, and in the expedition of Julian against the Persians in the 4th century was found deserted. **II. Seleucia Pieria**, a strong fortress of northern Syria, also founded by Seleucus I., was built at the foot of Mt. Pieria, on a rock overhanging the Mediterranean, a few miles N. of the mouth of the Orontes, and W. of Antioch, with which it was simultaneously founded, and of which it formed the seaport. It surrendered to Ptolemy III. of Egypt, was recovered by Antiochus the Great, and in the later period of the Syrian kingdom became independent. Under the Romans it rapidly decayed. Considerable ruins of its harbor, fortifications, and necropolis are still to be seen.

SELEUCUS I., Nicator, the founder of the Syrian monarchy, and of the dynasty of the Selencidæ, born about 358 B. C., assassinated at Lysimachia in 280. He was the son of Antiochus, one of the generals of Philip of Macedon, and accompanied Alexander in his Asiatic expedition. After the death of that monarch he adhered to the fortunes of Perdiccas, but soon after headed his assassins at Pelusium (321). On the second division of the empire he received the satrapy of Babylonia, joined Antigonus against Eumenes, and received from the former the government of Susiana. Antigonus very soon became jealous of his power, and planned his destruction. Seleucus escaped with about 50 horsemen, fled to Egypt, and formed a league with Ptolemy, Lysimachus, and Cassander against the common enemy. Seleucus regained possession of the government of Babylonia in 312, and from this year the Syrian monarchy is reckoned to commence. In 306 he assumed the title of king, and in 302 joined the new league formed by Ptolemy, Cassander, and Lysimachus against Antigonus. The war was ended by the victory of the allies at Ipsus in 301, when Antigonus was killed, and Seleucus obtained all the Asiatic territory conquered by the Greeks, with the exception of lower Syria and western Asia Minor. His empire, extending over about 1,000,000 sq. m., included parts of Cappadocia and Phrygia, Armenia, upper Syria, Mesopotamia, Media, Assyria, Babylonia, Susiana, Persia, Parthia, Bactria, and the territory east-

ward, probably including some parts of India. He founded the city of Seleucia on the Tigris, and removed the seat of government thither; but soon after the battle of Ipsus he made Antioch his capital. The change offended most of his Asiatic peoples, and served to hasten the disintegration of his dominions. The dissatisfaction increased when he divided the empire into 72 satrapies, setting over each a Macedonian or Greek. He afterward allied himself with Demetrius Poliorcetes, the son of Antigonus, whose daughter Stratonice he married; but Demetrius having made himself king of Macedonia, Seleucus joined the alliance against him in 288, and took possession of the greater part of his Asiatic dominions. Demetrius surrendered to him in 286, and remained at Apamea in Syria till his death. At the instigation of the widow of Agathocles, put to death by his father Lysimachus, Seleucus invaded the dominions of his rival with a large army. Lysimachus met him in a decisive battle on the plain of Corus in Phrygia in 281, and was routed and slain. Seleucus now determined to add Macedonia to his dominions, and crossed the Hellespont with a large army, but was assassinated by Ptolemy Ceraunus. He was succeeded by his son Antiochus. He founded Greek colonies in almost every province of his empire.—The dynasty of the Seleucidæ lasted 247 years, from 312 to 65 B. C. The most important successors of Seleucus were his son Antiochus I., 280–261; Antiochus II., 261–246; Antiochus III., the Great, 223–187; and Antiochus IV., Epiphanes, 175–164. The vast empire of Seleucus I. constantly diminished in power and extent, until it was finally absorbed by the Roman empire.—The era of the Seleucidæ, in chronology, is considered as beginning Oct. 1, 312 B. C. It was used in Syria, and by Jewish and Arab historians, until the 15th century.

SELF-DEFENCE. The law requires no man to submit passively to the infliction of violence upon his person. He may always defend himself. If he is assaulted with blows, he may return blows; and if need be he may kill an assailant who attempts, or, rationally considered, seems to attempt to take his life. The principle, in all cases, is that the counter violence must be only so much as is necessary for defence.—The old rule of the law that any who was guilty of a felony deserved death, probably founded the rule that it is justifiable to kill any one who is attempting to commit a felony, such for example as murder, mayhem, or rape. This rule is generally included in the law of self-defence. A man may also justify any violence done in defence of his wife, child, or servant, and either of these persons may justify violence in behalf of husband, father, or master.

SELINUS, the most westerly of the ancient Greek colonies on the S. W. coast of Sicily, at the mouth of the Selinus (now Madiuni) river. It was founded in the 7th century B. C., de-

stroyed by the Carthaginians in 409 and rebuilt, but decayed after the removal of the inhabitants to Lilybæum in 249. The ruins of the city of Selinus (now known as Selinunte and also as Madiuni) are 47 m. S. W. of Palermo, with vestiges of temples, one of which was dedicated to Heron, as shown by an inscription discovered in 1865. The largest were those on the hill E. of the city, outside the walls. One of these, with 8 columns in front and 17 on the sides, 359 ft. long and 162 ft. wide, is described in Swinburne's "Travels" (2 vols., 1777) as one of the most gigantic and sublime ruins imaginable. A new temple with many relics was discovered in 1874 by the architect Carellari, who continued his excavation in 1875. There is a fine collection of sculptured Selinuntine marbles in the museum of Palermo.—See *Selinus und sein Gebiet*, by Reinganum (Leipsic, 1827), and *Die Metopen von Selinunt*, by Benndorf (Berlin, 1873).

SELJUKS, or **Seljuks**, a Turco-Tartaric tribe, of the Uguric division of the race, originally inhabiting the plain N. of the Caspian sea. They received their name from Seljuk, one of their chiefs, under whose guidance in the 10th century they settled in Bokhara, and embraced Mohammedanism. His grandson Toghrul Beg received the title of sultan, conquered successively Khorasan and other Persian provinces, and in 1055 made himself master of Bagdad, which he occupied nominally as the servant and guardian of the caliph, but really with sovereign power, under the title of *emir el-omra* or "commander of the faithful." He died in 1063, and was succeeded by his nephew Alp Arslan, famous for his victories over Romanus Diogenes. (See **ALP ARSLAN**.) He was succeeded in 1072 by his son Malek Shah, who made Ispahan his capital, and extended his dominions from the frontiers of China to the neighborhood of Constantinople. The ill treatment of the Christian pilgrims to Jerusalem by his viceroys was the immediate cause of the crusades. On his death in 1092 the succession to the throne was disputed by his brother and his four sons, and a series of civil wars ensued, which ended in the partition of the Seljukian empire among four branches of the imperial family, of which the principal dynasty ruled in Persia, and the three younger dynasties at Kerman, Damascus, and Iconium. The last named, whose kingdom was called by the orientals the sultanate of Roum (that is, of the Romans), outlasted the others, enduring till the end of the 13th century, when it was succeeded by that of the Ottomans. During the greater part of the 13th century the Seljukian sultans were tributary to the Mongol emperors, who deposed and put them to death at pleasure.

SELKIRK, **Alexander**, a Scottish seaman, born at Largo, Fifeshire, about 1676, died on board H. B. M. ship Weymouth in 1723. He went from England in 1703 as sailing master of the privateer Cinque Ports, and in September,

1704, in consequence of a quarrel with his captain, was put ashore at his own request on the island of Juan Fernandez, which was then much frequented by vessels navigating the Pacific. He was supplied with clothes, arms, ammunition, and other necessities, and remained on the island in solitude four years and four months, when he was taken off by Capt. Woodes Rogers of the privateer *The Duke*, Feb. 12, 1709, and carried to England, where he arrived Oct. 1, 1711. He returned to Largo, but after some time eloped with a girl, whom he married, and went to London. Subsequently he entered the navy, and was lieutenant when he died. Capt. Rogers, in his narrative of his cruise (London, 1712), gave an account of Selkirk's residence on Juan Fernandez; and John Howell published "Life and Adventures of Alexander Selkirk" (Edinburgh, 1829). (See DEFOE, and JUAN FERNANDEZ.)

SELKIRKSHIRE, a S. county of Scotland, bordering on the counties of Edinburgh, Roxburgh, Dumfries, and Peebles; area, 260 sq. m.; pop. in 1871, 14,005. The surface is generally hilly, the hills varying from a few hundred feet in height to about 2,300. The principal rivers are the Tweed and its tributaries, the Yarrow and Ettrick; and there are several small lakes, that of St. Mary's being the finest sheet of water in the south of Scotland. Only about one tenth of the surface is arable.

—**SELKIRK**, the capital, is on the Ettrick, 2 m. from its mouth in the Tweed, 30 m. S. S. E. of Edinburgh; pop. in 1871, 4,640. It has a fine town hall, a monument to Sir Walter Scott, whose seat of Abbotsford is 4 m. distant, and manufactures of wool. Its formerly celebrated manufacture of shoes has declined. The only other town is Galashiels.

SELMA, a city of Alabama, capital of Dallas co., on the right bank of the Alabama river, 95 m. below Montgomery by the course of the river, and about 44 m. W. in a direct line; pop. in 1870, 6,484, of whom 3,660 were colored (by a more recent census, 8,112). In very dry seasons it is at the head of steamboat navigation. It stands on an elevated plateau, which terminates abruptly in a steep bluff forming the bank of the river. Six railroads converge at Selma: the Selma, Rome, and Dalton, the Alabama Central, the Western, the Selma and Gulf, the New Orleans and Selma, and the Selma, Marion, and Memphis. The last three are only partially constructed, and work upon them has been suspended. It has two banks, a cotton factory, an oil mill, a sash and blind factory, a car-wheel factory, three railroad and machine shops, a planing mill, a steam cotton press, six cotton warehouses, and three grist mills. Two daily and three weekly newspapers are published. There are 13 churches, viz.: 3 Presbyterian, 3 Methodist, 2 Baptist, 2 Protestant Episcopal, 1 Cumberland Presbyterian, 1 Congregationalist, and 1 Roman Catholic. There are two public and five private schools. —Selma was an important military and naval

depot of the confederate government during the civil war. An arsenal, a navy yard, nitre works, and foundries for shot and shell were established, giving employment to about 1,800 men. The place was strongly fortified, but the works were carried by assault by the federal forces under Maj. Gen. J. H. Wilson, April 2, 1865, after a short but severe contest with the garrison, under Lieut. Gen. Forrest.

SELTZER WATER (properly **SELTERS**). See **MINERAL SPRINGS**, vol. xi., p. 594.

SELWYN, *George Augustus*, an English clergyman, born in 1809, died April 13, 1878. He was educated at St. John's college, Cambridge, was rector at Windsor for a short time, and was consecrated missionary bishop of New Zealand in 1841, where he labored many years. In 1867 he was appointed bishop of Lichfield. He published "Are Cathedral Institutions Useless?" (1838); "Sermons" (1842); "Tribal Analysis of the Bible" (1855); and "The Work of Christ in the World" (1855).

SEMELE, in Greek mythology, daughter of Cadmus, and sister of Ino, Agave, Autonoe, and Polydorus. She was beloved by Jupiter, and Juno, jealous and indignant, persuaded her to ask him that he would appear to her clothed in the attributes of his majesty. Having sworn to grant her every request she would make, and warned her in vain to desist from this, he unwillingly consented, appeared as the god of thunder, and she was consumed by the lightning; but the child with which she was pregnant was saved by Jupiter, who enclosed him in his own thigh until the period for his birth. This child was Dionysus (Bacchus).

SEMENDRIA (Serb, *Smederevo*), a town of Servia, on the right bank of the Danube, at the confluence of the Yesava, 25 m. E. S. E. of Belgrade; pop. about 5,000. Next to Belgrade it is the most important Servian town and fortress, and it is the see of a Greek archbishop. Good firearms are made here. Formerly it was the capital of the kings of Servia, and it was often taken and retaken by the Turks and Hungarians or Austrians, ultimately remaining in possession of the Turks, who evacuated it in 1867, together with the other fortresses in Servia.

SEMINOLES, a nation of Florida Indians, made up chiefly of two bands of Creeks who withdrew from the main body in 1750 and 1808, and of remnants of tribes partly civilized by the Spaniards, some Mickasuckees, and negroes. They became known as a distinct nation under King Payne. During the American revolution they were under English influence, and very hostile. The Spaniards on recovering Florida made a treaty with the Tallapoosas and Seminoles at Pensacola in May, 1784. The Creeks, who called them Seminoles or Wanderers, still claimed them as part of their nation in the treaty with the United States in 1790. The Seminoles disavowed this claim, and began hostilities against the Americans in 1793, which they renewed in the war

of 1812, although under Spanish rule. They were then divided into seven tribes, and were rich in cattle, horses, and slaves. The war was very destructive to them. Their king Payne was killed in battle at Alachua in 1812, and his brother Bowlegs died soon after. The Creek war led to further trouble between them and the Georgians. In 1817 they surprised settlements on the Saltillo, and cut off Lieut. Scott and 40 persons on the Appalachicola, in revenge for the destruction of one of their forts. Gen. Gaines finally took the field against them, and Gen. Jackson at the head of a large force invaded Florida, and destroyed the Mickasuckee and Suwanee towns, in April, 1818, after hard fighting. The purchase of Florida the next year made them subject to the United States. In 1822 they numbered 3,899, with 800 negroes, in villages from St. Augustine to the Appalachicola, but roaming the whole country. By the treaty of Fort Moultrie, Sept. 18, 1823, the Seminoles gave up all their territory but a small portion, for \$6,000 in goods and a 20 years' annuity of \$5,000; but as Neamathla and other head chiefs refused to join, small reserves were allowed them and their followers by an additional article, Jan. 2, 1824. They also agreed to arrest, hunt up, and deliver fugitive slaves. The enforcement of this led to great trouble. The settlers clamored for the removal of the Indians, and a strange treaty was made at Payne's Landing (1832), by which the Seminoles agreed that if certain commissioners, Indians and others, were satisfied as to the character of the country offered them west of the Mississippi, and the disposition of the Creeks to receive them, the treaty should be binding, and they were to give up all their lands in Florida for \$15,400 and \$3,000 a year for 15 years, but \$7,000 was to be retained for slaves not surrendered. The Seminole delegates were induced to sign a document at Fort Gibson in March, 1833, declaring themselves satisfied. Although they denied having done so understandingly, and the so-called additional treaty did not follow the terms of the original treaty of Payne's Landing, the latter was held to have become absolute, and was ratified by the president and senate in August, 1834. Gen. Thompson, when sent as agent, finding the chiefs opposed to emigration, undertook to depose five, and put Osceola in irons. The Seminoles killed a chief who favored emigration, and then prepared for war. On Dec. 28, 1835, Osceola killed Thompson, a lieutenant, and some others at Fort King, and the same day cut to pieces a body of troops under Major Dade near Wahoo swamp. A long and desolating war ensued, which cost the United States \$10,000,000 and 1,466 lives. The Seminoles met Gen. Clinch on the Withlacoochee, Dec. 31, and subsequently baffled Gen. Scott; but they were so hard pressed by Gen. Call and Gen. Jesup that, after losing several battles, they asked for peace, and in the spring of 1837 agreed to emigrate. Osceola,

however, fled to the woods, and renewed the war. He was defeated by Gen. Taylor in the battle of Okeechobee, and soon after was treacherously seized and kept in confinement till he died. The war was kept up by Coacoochee till he was taken. The prisoners and those who came in were transported to Indian territory, and 1,900 had been removed in 1839. In 1842 those in Florida were reduced to 300, and the war ended. No proper provision was made for the emigrants, and the Creeks wished to absorb them; but a treaty made in 1845 gave them some relief and a separate tract. The negroes among them were claimed by the Creeks or white men, and taken in such numbers that Coacoochee with a large body retired to Mexico. The treaty of Aug. 7, 1856, between the United States, the Creeks, and the Seminoles, recognized them as a nation, and assigned them lands west of the Creeks, which were, however, laid off so incorrectly that they were found to be all within the Creek district. It gave also \$90,000 to the Seminole council, and \$12,500 as an annuity. Of those in Florida, 164 emigrated under Bowlegs in 1858, and the next year, with those who returned from Mexico, their number swelled to 2,253. On the breaking out of the civil war the tribe was divided. The Confederate States made a treaty with them, Aug. 1, 1861, guaranteeing their lands, assuming the obligations of the United States, and agreeing to indemnify them for slaves taken from them by Gen. Gaines. Those who adhered to the government suffered heavy loss in the battle of Dec. 25, 1861, and the survivors retired to Kansas. A treaty was made with the northern and southern bands in December, 1865, by which their old reservation was ceded to government at 15 cents an acre, and a new reservation purchased for them of the Creeks at 50 cents an acre. They then numbered 2,959, including negroes. They are steady, sober, and industrious, and in progress rank next to the Cherokees, Creeks, and Choctaws. Under the treaties of 1856 and March 21, 1866, they receive \$25,000 as an annuity, \$2,500 for schools, and \$1,000 toward the support of the tribal government. In 1874 they had one mission and four district schools; they numbered 2,438, and cultivated 7,600 acres. Their personal property was valued in 1870 at \$237,000. There are still some Seminoles and negroes in Mexico, and 150 or more in the Everglades of Florida. There are also in Texas some 500 negroes formerly slaves to the Seminoles, who returned from Mexico, and in 1875 asked government for lands in Florida or elsewhere.

SEMPOLATINSK. I. A province of Asiatic Russia, in the division of Central Asia, bounded by the governments of Tomsk and Tobolsk, the province of Akmolinsk, Russian Turkistan, and China; area, 188,298 sq. m.; pop. in 1870, 510,163. It comprises part of the country of the Kirghiz, and is divided

into the circles of Semipolatsk, Karkaralinsk, Kokpekty, and Pavlodar. **II.** A fortified town, capital of the province, on the Irtysh, 460 m. S. W. of Tomsk; pop. in 1867, 14,135. It contains several government establishments, and carries on a considerable trade with Bokhara, Tashkend, Kashgar, and the Kirghiz.

SEMIRAMIS, a queen of Assyria, who, according to fabulous traditions handed down by classical authors, reigned about 2000 B. C. Assyriologists suppose that she is the queen Sammuramit, wife of Iva-lush, who lived about 800 B. C. Ctesias, according to Diodorus Siculus, describes her as the daughter of the fish goddess Derceto of Ascalon, and as the wife first of Oannes, and then of Ninus, who died soon after his marriage with her, and left her the sole mistress of the Assyrian empire. She then caused the city of Babylon to be built, encircling it with a wall flanked by many towers and of great height, throwing bridges over the Euphrates, providing it with aqueducts and canals, and erecting in it gorgeous palaces and temples. This done, she made an expedition into Media, Persia, and Armenia, subdued Egypt and the greater part of Ethiopia, and would have conquered India also if her army had not been put to flight by the war elephants of King Stratobatis. Thenceforward she devoted herself entirely to the internal improvement of her empire, and, according to Strabo, in course of time every great work in Asia was popularly attributed to her. Learning that her son Ninyas was plotting against her, she abdicated, left the empire to him, and disappeared as a dove. The real Sammuramit was a queen who had some important works executed at Babylon, but was otherwise of little significance in the political history of the country. It is probable that the accounts of the Greeks are a blending of some of the mythological conceptions of the Babylonians with the facts and popular legends of the early history of the empire.—See F. Lenormant, *La légende de Sémiramis* (Paris, 1874).

SEMITIC RACE AND LANGUAGES. The Semitic race constitutes one of the most important and largest divisions of the Mediterranean or Caucasian type of mankind. (See **ETHNOLOGY**.) The name Semitic (properly Shemitic), first applied by Eichhorn, is in a measure a misnomer, inasmuch as modern ethnology and linguistic science designate by it a much larger family of peoples than are represented in Genesis as descendants of Shem. The inhabitants of Syria and adjoining parts of Mesopotamia, and the coast lands of Palestine, forming the division of North Semites, and the population of Arabia and parts of N. E. Africa, constituting the South Semites, are now grouped together as Semites proper, or Eusemites. Thus the Aramæans (Syrians and Chaldeans), Hebrews, and Phœnicians are North Semites; and the central Arabs or Ishmaelites, South Arabs or Joktanites, and the inhabitants of Ethiopia or Abyssinia, are South Semites.

Furthermore, the term Semitic is made to embrace not only the Phœnicians and Ethiopians, but almost all the large group of peoples usually called Hamites in reference to the Biblical genealogies. The Hamitic Semites, or Dyssemites, include, besides the primitive Assyrians, Babylonians, and Phœnicians, the following three branches: the Egyptian, comprising the ancient Egyptians and the Copts or modern Egyptians; the Libyan, formed by the Berbers and Tuariks (Amazirgh or Imosharh), the Kabyles, Shelloohs, and Guanches; and the Ethiopian, represented by the Bedjas, Bogos, Saho, Agow, Fellatahs or Foolaahs, Galla, Danakil, and Somaali. Lepsius, adopting the opinion of Bleek, the great student of the African languages, includes still another branch, which he calls the South African, and in which he reckons the Hottentots and Bushmen, but of course only from a linguistic point of view. The wide meaning thus given to the term Semitic has been found necessary on account of the almost inextricable interrelationship between the Hamites and the Semites proper. Whether in Mesopotamia, in Palestine, in north Africa, or even in Arabia, the Hamites not only appear as the neighbors of the Semites, but as having generally been ethnologically absorbed by them. The Bible indicates the close relationship existing between Hamites and Semites by representing the Cushites as children of Ham, and the Canaanites as descendants of Cush, and repeatedly applying the name Cush to peoples closely connected with Semites proper. (See **CUSH**.) The enormous gaps between the historical beginnings of the various divisions of the Hamito-Semitic family render futile every attempt to trace a line of migration connecting them all, or to place their common cradle in any one portion of the globe. To ascertain the original physical type of the race, anthropologists turn to the pictorial representations on Egyptian monuments, and examine the proportions of mummies. They were of medium height, the skin reddish yellow, head and face oval, hair dark and curly; the nose was set so as to continue almost in a straight line the massive forehead, and, though often gently turned at the extremity, was never thick and flat. The skeletons of mummies have always exhibited the same proportions as those of the rest of the Caucasian or Mediterranean race. This early type, in which the characteristics of the Hamites are supposed to preponderate, becomes gradually modified from age to age, until the monuments and mummies of a more recent date show those forms and facial outlines which are to this day the distinguishing features of Semites proper, namely: a long face; a medium broad and high forehead; a protruding and strongly bent nose; deep set, vivid eyes, underneath black and heavy brows; undulating, curly hair and beard of brilliant black; the color of the skin of all shades between white, yellow, and brown; well devel-

oped muscles, and symmetrical extremities. It is generally assumed that there is a marked difference between the intellectual development of the Hamites and Semites proper. If the Egyptians, Assyrians and Babylonians, and Phœnicians are essentially Hamitic, the Semites must be considered inferior to them. The Hamites were rather an agricultural race. They early organized into states and empires, and centralized the executive power. They erected colossal monuments and edifices, like the pyramids of Egypt and the palaces of Assyria. Their minds had essentially an objective tendency, and their materialism found utterance in the lascivious religious rites of the Babylonians, and in the strange views and worship of the people of the Nile. Their literature was principally historical, though recent Assyrian and Egyptian discoveries have also brought to light literary productions in other arts and sciences. The peoples designated as Semites proper were generally nomadic. They consisted of independent tribes, which united under some form of patriarchal government. They lived in tents, and had but little taste for architecture and other plastic arts. The Hebrews and Arabs, however, have displayed a peculiar versatility of mind, which allowed them to build up states in various forms, adapt the arts and sciences of other nations, develop extensive literatures, and produce the foremost religions of the world. Monotheism prevails in the religious conceptions of the Semites proper, and the lyric element in their poetry. To the Hamito-Semitic peoples the civilized world is indebted also for the art of writing. The Greeks borrowed their alphabet from the Phœnicians, who imitated the hieroglyphs of the Egyptians. (See WRITING.)—LANGUAGES. No comparative grammar of the Semitic languages proper, or of the Hamitic group alone, much less of the entire Hamito-Semitic family, has been written, and hence it is not fully established in what their common linguistic property consists. There are many minor treatises on special branches of Semitic comparative philology, but no one has even attempted to sum up the general results so far reached, which are very meagre. The opinion that the Assyro-Babylonian language of the cuneiform inscriptions is the Sanskrit of the Semitic family, rests on a very insecure foundation of philological facts. It cannot be denied that the Canaanite group of peoples, Hebrews and Phœnicians, spoke languages much akin to Babylonian; Aramaic manifests a similar relationship by the prevalence of reflexive formations, the want of an article, the transcription of the genitive by a relative pronoun, and by the assimilation of the nasal in *nun* verbs. But on the other hand it is much more consistent with the principles applied to the Indo-European family to allow the claim of priority to the Arabic language, and to consider the other Semitic tongues as shortened or shrunken forms of it, or as having pro-

ceeded from a primordial language of which Arabic is now the representative. The mutual connection of the Semitic idioms proper is very close, so much so that they seem to be dialects of a single tongue, and the differences between them are no greater than between the subdivisions of any branch of the Indo-European family. Ordinarily the type of Semitic speech is spoken of as being inflective like the Indo-European languages; but it does not necessarily follow that both families are of one origin, even if the system of inflection in Semitic were much more like the Aryan than it is. What is above all characteristic of the Semitic languages is the trilateralism of the roots, which in Indo-European tongues are always monosyllabic. Then again, while Indo-European roots are vocalic in form, the Semitic are consonantal. In Semitic the vowel is subordinate, and changeable in inflection, while the consonant is not. The vowel determines only the manner or form of the idea or thing conceived; the idea itself can only be represented by consonants. There is sometimes a semblance of a vocalic root, but there is none such in fact. There are many reasons for concluding that the roots originally numbered only two consonants, and that the triliters and pluriliters are subsequent developments. According to E. Meier, the third radical consonant must be regarded as a reduplication of the originally monosyllabic root, and he has undertaken in his *Hebräisches Wurzelwörterbuch* to analyze the entire root matter of the Hebrew verbs, and to reduce the triliters to radicals of two consonants only. In the opinion of many Semitic scholars, however, his theory is an illusion. The fact that all the Semitic phonetical graphic systems, among which the Egyptian hieroglyphs and the Assyrian cuneiforms are not included, are composed of consonants only, is of great significance. Some of them have a larger number of letters than the Phœnician alphabet from which they are derived, but the nature of the sounds and the manner of uttering them remain the same, and the additional ones are only reduplicated forms of them. Though the graphic systems are of the same origin, and are of a distinctive character constituting them a separate family among the methods of writing, yet they may be subdivided into two groups: one consisting of the primitive Hebrew and Samaritan, and called the Hebrew-Samaritan group; the other comprising Palmyrene, Pamphylian, the square Hebrew characters, Estranghelo and the other Syriac alphabets, the Sabæan or Mendaitic, the Auranitic, the Nabathean and the Arabic, Cufic, and Neshky, and known as the Aramaean group. While the latter subdivision is a direct descendant from the early Aramaean style of writing, the former is a derivative from the archaic Hebrew of the inscriptions. The line of descent will be easily seen on comparing the following alphabets with those given in the article PHœNICIA, vol. xiii., p. 456:

Names of characters.	Archæic Hebrew.	Palmyrene of 10 B. C.	Modern Hebrew type.	English equivalents.
Aleph.....	א	𐤀	א	a
Beth.....	ב	𐤁	ב	b
Gimel.....	ג	𐤂	ג	g
Daleth....	ד	𐤃	ד	d
He.....	ה	𐤄	ה	h
Vav.....	ו	𐤅	ו	v
Zayin.....	ז	𐤆	ז	z
Cheth.....	ח	𐤇	ח	kh
Teth.....	"	"	ט	t
Yod.....	י	𐤈	י	y
Kaph.....	כ	𐤉	כ	k
Lamed.....	ל	𐤊	ל	l
Mem.....	מ	𐤋	מ	m
Nun.....	נ	𐤌	נ	n
Samech...	ס	𐤍	ס	s
Ain.....	ע	𐤎	ע	Indefinite.
Pe.....	"	פ	פ	p
Tsade.....	צ	"	צ	ts
Qoph.....	ק	𐤏	ק	q
Resh.....	ר	𐤐	ר	r
Shin.....	ש	𐤑	ש	sh
Tav.....	ת	𐤒	ת	th

Besides the vowel modifications influencing the sense of the word itself, the Semitic tongues make a wide use of external formative elements, of prefixes and suffixes, and to a more limited extent also of infixes or inserted letters or syllables. There is a marked difference between the Semitic and the Indo-European verb. While equally distinguishing the singular, dual, and plural numbers, and the first, second, and third persons, and forming in a measure after the same fashion the various personal endings, namely, by adding pronominal elements to the verbal roots, yet the Semitic conception of the order of time is so utterly at variance with the Aryan conception of it as to produce an entirely different system of conjugation. There are in Semitic but two tenses, the one denoting generally completed action, and the other incomplete, but both are capable of expressing in certain circumstances present, past, and future time. Though subjunctive, imperative, and other less important modal forms appear

in conjunction with the imperfect, yet the Semitic languages are almost wholly devoid of genuine modal expressions. In their stead the verb admits of a large number of conjugations, giving to it either a transitive, causal, intensive, iterative, conative, reflexive, or other similar meaning. Every conjugation has special forms of verbal nouns and adjectives, infinitives, and participles. The system of conjugations is not equally developed in all the languages belonging to the Semitic family; but, as may be seen in Arabic, it is possible for a verb to have 15 conjugational forms. With the exception of Arabic, no Semitic language distinguishes case, and in Arabic no other than the nominative, genitive, and accusative is indicated. Otherwise nouns are either masculine or feminine, and admit of singular, plural, and dual number.

SEMLER, Johann Salemo, a German theologian, born in Saalfeld, Dec. 18, 1725, died in Halle, March 14, 1791. He studied at Halle, and in 1750 became editor of the *Coburger Zeitung*, in 1751 professor of history at Altdorf, and in 1752 professor of theology at Halle, where he was made director of the theological seminary in 1757. He was at first a pietist, but became a leader of the rationalists. He distinguished between the canonicity and inspiration of the Scriptures, maintaining that they are divine only so far as their contents are of an ethical nature, that the sacred writers "accommodated" their expressions to the mistaken ideas of their times, and that a just criticism can retain the divine element while rejecting what is accommodated and false. He was however an earnest opponent of deism. His works include *Selecta Capita Historiæ Ecclesiasticæ* (3 vols., 1767-'9); *Commentationes Historiæ de Antiquo Christianorum Statu* (2 vols., 1771-'2); *Abhandlung von der Untersuchung des Kanons* (4 vols., 1771-'5); *Apparatus ad liberalem Veteris Testamenti Interpretationem* (1773); *Institutio ad Doctrinam Christianam* (1774); *Versuch einer biblischen Dämonologie* (1776); *Versuch christlicher Jahrbücher* (2 vols., 1783-'6); and *Observationes Novæ, quibus Historia Christianorum usque ad Constantinum Magnum illustratur* (1784). He also published an autobiography (2 vols., 1781-'2).

SEMLIN (Slavonian, *Zemun*; Hun. *Zimony*), a town of the Hungarian kingdom, in Slavonia (formerly in the Military Frontier), at the junction of the Save with the Danube, 3 m. N. W. of Belgrade in Serbia; pop. in 1870, 8,915, mostly Slavonians, Serbs, Germans, and Jews. It is the principal entrepot of the trade between Austria and Turkey. During the Hungarian and Austrian wars with the Turks its situation often gave it importance.

SEMMERING, or **Sömmering**, a branch of the Noric chain of Alps, between Austria proper and Styria, 4,416 ft. high, containing the principal pass between Lower Austria and the more southern provinces of the Austrian empire. In the 14th century a duke of Styria

founded a hospital for travellers on the Styrian side of the pass. A post and carriage road over the mountain was completed by the emperor Charles VI. in 1728; it rises, partly by zigzags, upward of 3,000 ft. above the sea. A new highway, longer, but more practicable, was completed in 1840. A railway over the Semmering, projected and undertaken by a private company, was executed for the Austrian government by the engineer Carlo Chèga between 1848 and 1854. It extends 25 m. from Gloggnitz, at the N. extremity of the pass, to Mürzzuschlag, at the S. extremity. It rises from Gloggnitz, crossing the Schwarzer on a curved viaduct of 13 arches, and sweeping along the shoulders of the hills through a series of magnificent engineering works, including 15 tunnels and 15 bridges, till it attains a height of 2,893 ft. above the sea, when any further ascent is avoided by a tunnel nearly a mile long.

SEMMES, Raphael, an American naval officer, born in Charles co., Md., Sept. 27, 1809, died at Point Clear, Ala., Aug. 30, 1877. He entered the navy in 1826, became lieutenant in 1837, and commander in 1855. In 1834, while awaiting orders, he studied law and was admitted to the bar at Cumberland, Md. During the Mexican war he served both on board ship and as an aide to Gen. Worth. On the outbreak of the civil war he resigned the secretaryship of the lighthouse board at Washington, took command of the confederate steamer Sumter at New Orleans, ran the blockade at the mouth of the Mississippi, and in July, 1861, captured several American merchant vessels in the gulf. He then went to Southampton, England, where he was for some time closely watched by the United States steamer Tuscarora. When he put to sea, the Tuscarora was detained 24 hours by the British authorities; but she followed him to the straits of Gibraltar, and so closely blockaded him in the port of Tangier, that he sold his vessel and returned to England. In August, 1862, he took command of the steamer Alabama, built for him at Birkenhead, England, and manned by an English crew, and continued his career of capturing and destroying merchant vessels. On Jan. 11, 1863, off Galveston, Texas, he engaged the United States gunboat Hatteras, and after a short action sunk her. On June 19, 1864, in an engagement 9 m. off the harbor of Cherbourg, France, the United States steamer Kearsarge, Capt. Winslow, sunk the Alabama. Semmes was taken up by the English yacht Deerhound and carried to England. After the close of the war he entered upon the practice of law in Mobile, Ala. He was arrested and taken to Washington in December, 1865, but was only imprisoned four months. He afterward delivered public lectures on his exploits. He published "Service Afloat and Ashore during the Mexican War" (1851); "Campaign of Gen. Scott in the Valley of Mexico" (1852); "The Cruise of the Alabama and the Sum-

ter" (London and New York, 1864); and "Memoirs of Service Afloat during the War between the States" (8vo, Baltimore, 1869).

SEMPACH, a town of Switzerland, on the lake of the same name, in the canton and 10 m. N. W. of the city of Lucerne; pop. in 1870, 1,109. It is celebrated for a battle fought July 9, 1836, in which 1,300 Swiss vanquished a large Austrian army, through the heroic self-sacrifice of Arnold of Winkelried. (See WINKELRIED.) The Austrian duke Leopold and 1,400 of his knights, with thousands of his foot followers, were slain. A chapel marks the site of the battle field.—See *Die Quellen zur Sempacher Schlacht und die Winkelried-Sage*, by Otto Kleissner (Göttingen, 1873).

SEMPER. I. Gottfried, a German architect, born in Hamburg in 1804. He completed his studies in Italy and Greece, and was professor at the academy of art in Dresden and at the school of architecture from 1834 to 1849, when, being implicated in revolutionary movements, he fled to London. Here he taught at the royal academy till 1856, when he became connected with the polytechnic institute at Zürich. His principal works are the observatory at Zürich, the Festtheater at Munich, new theatres at Dresden and Darmstadt, and the new museum and the new imperial palace in Vienna. He has published *Die vier Elemente der Baukunst* (1851), *Wissenschaft, Industrie und Kunst* (1852), and *Der Styl in den technischen und tektonischen Künsten* (2 vols., 1860-'65).—His son **HANS**, born in Dresden in 1845, and since 1871 professor of German in Rome, has published *Uebersicht der Geschichte der toscanischen Sculptur bis gegen das Ende des 14. Jahrhunderts* (1869), and *Donatello, seine Zeit und seine Schule* (1870 et seq.). **II. Karl**, a German traveller, nephew of the preceding, born in Altona, July 6, 1832. He explored the Philippine islands, and in 1868 became professor of zoölogy at Würzburg. He has published *Reisen im Archipel der Philippinen* (3 vols., 1867-'72); *Die Philippinen und ihre Bewohner* (1869); and *Die Palau-Inseln im Stillen Ocean* (1873).

SEMPLE, Robert Baylor, an American clergyman, born at Rose Mount, King and Queen co., Va., Jan. 20, 1769, died at Fredericksburg, Va., Dec. 25, 1831. He studied theology, became in 1790 pastor of the Bruington Baptist church, and took a leading part in the educational and missionary operations of his denomination, and in the colonization society. In 1820 he was elected president of the Baptist triennial convention, and held the office till his death. In 1827 he became the financial agent of Columbian college, D. C., retaining his pastorate. He published a catechism; a "History of Virginia Baptists," with several biographical notices appended (1810); a "Memoir of Elder Straughan;" and "Letters to Alexander Campbell."

SENAC. I. Jean Baptiste, a French physician, born near Lombez, Gascony, in 1693, died in

Paris, Dec. 20, 1770. He became physician to Marshal Saxe in 1745, and accompanied him through his campaigns. In 1752 he was appointed first physician to Louis XV., by whom he was subsequently made a councillor of state and superintendent general of the mineral waters of the kingdom. His principal work is a *Traité de la structure du cœur* (2 vols. 4to, 1748-'9; new ed., enlarged by Portal, 1774).

II. Gabriel Senac de Meilhan, son of the preceding, born in Paris in 1736, died in Vienna, April 5, 1803. He held various important public offices, and published several works, the best of which is *Le gouvernement, les mœurs et les conditions en France avant la révolution* (latest edition, with introduction and notes by H. de Lescure, Paris, 1862).

SENATE (Lat. *senatus*, an assembly of elders), the deliberative assembly of the Roman people. It was composed originally of 100 members, each representing one of the *decurie* into which the *populus Romanus*, or body of the Roman citizens, when it comprehended but a single tribe, the Ramnenses, was divided. When the Sabines or Titienses were incorporated with the Ramnenses as a second tribe, an equal number of senators was added; and on the admission of the third tribe, the Luceres or Lucerenses, in the reign of Tarquinius Priscus (according to the opinion of recent critics), the number was increased to 300. The new senators were distinguished from those of the two earlier tribes (who were called *patres majorum gentium*) by the title of *patres minorum gentium*. The number was diminished considerably during the reign of Tarquin the Proud, but at the formation of the republic was recruited to the established standard from the principal plebeians of the equestrian order, who were thence called *conscripti*, and it was thereafter customary to address the whole senate as *patres conscripti*, that is, *patres et conscripti*. No permanent change seems to have been made in the number of the senators until the time of Sulla, when it was increased to about 600 by the addition of about 300 *equites*. Julius Cæsar created several hundred new senators, and during the second triumvirate the number exceeded 1,000. Augustus reduced it to 600. The senators held office for life, and were originally men of advanced age; but under Augustus they were admitted in their 25th year. They were elected during the kingly period by the *decurie*, under the republic by the consuls and consular tribunes, and after the establishment of the censorship by the censors exclusively. The persons eligible to fill vacancies were those who had been questors or curule magistrates, and the latter held seats *ex officio*, and were entitled to speak but not to vote. The plebeians as an order were never eligible, but after the questorship and curule magistracies were opened to them, they of course frequently attained to the senatorial dignity. Hence the senate became gradually the real repre-

sentative of the people. No property qualification seems to have been required previous to the time of Augustus, who established a senatorial census, which was increased from 400,000 sesterces to 1,200,000; and any senator falling short of this amount was obliged to withdraw from office. Senators were forbidden to engage in mercantile pursuits, and no one was eligible to office whose parents were not of free birth; but from both these requirements there appear to have been frequent deviations. The senate met on the kalends, nones, and ides of each month during the republic, and under Augustus on the kalends and ides only; but extraordinary meetings could be convoked on any day not a *dies comitalis* or a *dies ater*, by a variety of magistrates, who on such occasions exercised the privilege of presiding. At regular meetings under the empire one of the consuls, or the emperor if a consul, generally presided; and the number of senators constituting a quorum seems to have varied from about 70 to 400. The title of *princeps senatus*, which was originally associated with that of *custos urbis*, and conferred the power of convoking and presiding over the senate, became after the overthrow of the republic purely honorary, and was usually borne by the emperors. After the time of Julius Cæsar the proceedings were regularly recorded by scribes appointed for the purpose. The powers of the senate during the republic comprehended the general care of the public welfare, the superintendence of all matters of religion, the management of all affairs with foreign nations, and the disposition of the finances requisite for these purposes. Its enactments, called *senatus consulta*, which were passed by a majority of votes, under Augustus and his successors took the place of the *leges* enacted by the *comitia tributa*. Its authority was considerably impaired after the institution of the tribunes of the people, and in the latter part of the republic it frequently became merely an instrument in the hands of ambitious generals. The establishment of the empire reduced it to a condition of purely subordinate power, whose functions and very existence were dependent on the will of the emperor; but as a high court of justice it still possessed a considerable degree of importance. A second senate was established by Constantine at Byzantium, upon which Julian conferred powers similar to those of the Roman senate. The latter body continued in existence until the Gothic conquest of Italy, and seems to have been the last depository of what remained of the old national spirit.—The affairs of the Italian cities and provincial towns of the Roman empire were administered by bodies called senates, whose functions were generally civic; and the term is frequently employed in modern times to designate the upper house of the legislature in republican or limited monarchical governments. The senate of the United States is composed of two members for

each state of the Union, who are elected by the legislatures of the states and hold office for six years. In addition to its legislative functions, it has the power of ratifying foreign treaties and nominations to office made by the president, and is the high court of impeachment for public functionaries. Each state of the Union has a legislative chamber which exercises functions of a similar nature, though differing in degree.—The French senate, called the *sénat conservateur*, came into existence after the revolution of the 18th Brumaire (1799), and was originally composed of 80 members of at least 40 years of age. Its chief functions were to prevent violations of the constitution, to introduce changes into that instrument, and to elect the consuls, tribunes, and members of the legislature from lists prepared by the departments. It soon became a tool in the hands of the first consul, and on the establishment of the empire was reduced to the condition of a state council. It was replaced by the chamber of peers at the restoration of the Bourbons, but was revived by Napoleon III. in 1852. This senate was abolished by the revolution of Sept. 4, 1870. In the present French republic, as constituted by the organic laws of Feb. 25, 1875, the senate is to consist of 300 members, 225 elected by the departments, and 75 appointed for life by the national assembly.—The Hanseatic towns are governed by senates, and similar bodies, having legislative functions of various degrees of importance, are recognized by the constitutions of Belgium, Denmark, Italy, and some other European governments. The Russian senate is the supreme judicial tribunal of the empire, and its decrees, when not vetoed by the emperor, have the force of law. In many countries of Europe, particularly in Germany, the affairs of universities are administered by academic senates, composed of the professors, over which the government exercises a control.

SENECA. I. A W. central county of New York, bounded E. by Cayuga lake and Seneca river and W. chiefly by Seneca lake, and drained by the Seneca and Clyde rivers; area, 330 sq. m.; pop. in 1870, 27,823. The surface is hilly and the soil generally very fertile. The New York Central and the Geneva, Ithaca, and Athens railroads, and the Erie and the Cayuga and Seneca canals, traverse it. The chief productions in 1870 were 542,407 bushels of wheat, 420,366 of Indian corn, 627,190 of oats, 409,340 of barley, 22,995 of buckwheat, 182,704 of potatoes, 37,048 tons of hay, 166,416 lbs. of wool, 812,811 of butter, and 100,901 of flax. There were 8,314 horses, 7,073 milch cows, 6,422 other cattle, 28,663 sheep, and 6,997 swine; 17 manufactories of carriages and wagons, 3 of fire engines, 7 of iron castings, 2 of machinery, 7 of malt, 12 of saddlery and harness, 2 of wooden ware, 3 of woollen goods, 9 brick yards, 4 tanneries, 2 distilleries, 12 flour mills, and 15 saw mills. Capitals, Ovid and Waterloo. II. A N. coun-

ty of Ohio, intersected by Sandusky river and Honey and Green creeks, and traversed by several railroads; area, 540 sq. m.; pop. in 1870, 30,827. The surface is almost level, well timbered, and very fertile. The chief productions in 1873 were 621,176 bushels of wheat, 900,915 of Indian corn, 386,564 of oats, 77,232 of potatoes, 484,844 of apples, 34,712 tons of hay, 339,966 lbs. of wool, and 708,252 of butter. In 1874 there were 11,226 horses, 23,091 cattle, 75,914 sheep, and 28,644 swine. In 1870 there were 14 manufactories of agricultural implements, 4 of brick, 12 of carriages and wagons, 6 of iron castings, 1 of woollen, 3 breweries, 7 flour mills, 17 saw mills, 3 planing mills, and 7 tanneries. Capital, Tiffin.

SENECA. I. **Marcus Annaeus**, a Roman rhetorician, born in Corduba (Cordova), Spain, about 61 B. C., died in Italy probably about A. D. 35. He was a member of the equestrian order, and appears to have spent part of his early life in Rome, but afterward returned to Spain, and there married. It is said that he compiled at the request of his children the brilliant and famous sayings which he himself had heard from the rhetoricians of his time. This work was entitled *Oratorum et Rhetorum Sententia*, &c., and consisted of two divisions, one called *Controversiæ*, the other *Suasoria*, only fragments of which are extant. See Koerber, *Ueber den Rhetor Seneca und die Römische Rhetorik seiner Zeit* (Cassel, 1864). II. **Lucius Annaeus**, a Roman stoic philosopher, son of the preceding, born in Corduba a few years before the Christian era, died in Rome, A. D. 65. He studied rhetoric and philosophy in Rome, travelled in Greece and Egypt, and became an advocate, and subsequently quæstor. Messalina, the wife of the emperor Claudius, having accused him of adultery with Julia, the emperor's niece, he was banished to Corsica for eight years, during which he wrote one of his best treatises, the *Consolatio ad Helvium*, addressed to his mother, and the *Consolatio ad Polybium*, to a powerful freedman of Claudius. The authenticity of the latter has been doubted. In A. D. 49, through the influence of Agrippina, who after the death of Messalina had married her uncle Claudius, Seneca was recalled, and was made prætor. Subsequently, with Afranius Burrhus, he became tutor to the young Domitian, the future emperor Nero. After Claudius had been poisoned by his wife, Nero ascended the throne, and Burrhus and Seneca placed themselves in opposition to the pretensions of Agrippina. Not long afterward Nero put his mother to death for her opposition to Poppea, fled to Naples, and sent to the senate a letter written by Seneca, in which he charged Agrippina with a conspiracy against himself, and with having committed suicide in consequence of its failure. In 63 Burrhus died, and Seneca, conscious that the emperor coveted his wealth, offered to surrender his property and retire. This the emperor refused, and from

this period, says Tacitus, Seneca "kept no more levees, declined the usual civilities which had been paid to him, and under pretence of indisposition avoided appearing in public." It is said that Nero tried to poison him, and soon afterward he was accused of complicity in the conspiracy of Piso, and ordered to commit suicide. Without showing any sign of alarm, Seneca had the veins of his arms opened; but as he was thin from age and meagre diet, the blood flowed slowly, and the veins in his legs were also opened. As he suffered excessively, a dose of hemlock was given, but without producing any effect. He was then placed in a warm bath and afterward taken into a vapor stove and suffocated. His wife, Paulina, caused her own veins to be opened, but by order of Nero they were tied up by her attendants, and she lived a few years longer. Besides the two treatises already mentioned, Seneca wrote *De Ira*; *De Consolatione ad Marcianum*; *De Providentia*; *De Animi Tranquillitate*; *De Constantia Sapientis*; *De Clementia ad Neronem*; *Cesarem*; *De Brevitate Vitæ ad Paulinum*; *De Vita Beata ad Gallionem*, to which is sometimes added *De Otio aut Secessu Sapientis*; *De Beneficiis*; 124 *Epistolæ ad Lucilium*, containing moral maxims and observations; *Apocolocyntosis*, a satire on the emperor Claudius; and *Questionum Naturalium Libri VII.* Several other works by Seneca are now lost. Ten tragedies are attributed to him, but their authenticity has been denied: *Hercules Furens*, *Thyestes*, *Thebais* or *Phœnix*, *Hippolytus* or *Phædra*, *Edipus*, *Troades* or *Hecuba*, *Medea*, *Agamemnon*, *Hercules Cæteus*, and *Octavia*. The character and the works of Seneca have been the subject of much controversy. Though a stoic philosopher, he was charged by a contemporary with having amassed an immense fortune by extortion. He was no believer in the superstitions of his country, and has been called an atheist; but his religion appears to have been pure deism. On the other hand, it has been asserted that he was a Christian, and was acquainted with St. Paul; and 14 spurious letters purporting to be written by him to that apostle were printed in the old editions of his works. The *editio princeps* of Seneca is that of Naples (fol., 1475). Of the numerous later editions, that of Schröder (4to, Delft, 1728), the Bipont edition (Strasburg, 1809), and that of F. H. Bothe (2 vols. 8vo, Leipzig, 1819) are valuable. There have been several translations into English.

SENECA FALLS, a village of Seneca co., New York, on the outlet of Seneca lake, the Cayuga and Seneca canal, and the New York Central railroad, 160 m. W. by N. of Albany; pop. in 1870, 5,890; in 1875, 6,125. It has abundant water power and a variety of manufactures. The chief articles produced are steam fire engines, woollens, pumps, flour, machinery, and farming utensils. There are two national banks, an academy, two weekly newspapers, and seven churches.

SENECA LAKE, a narrow sheet of water, lying nearly N. and S. in the W. part of New York, bordered by Seneca, Schuyler, Yates, and Ontario cos. It is about 37 m. long by 2 to 4 m. broad, has an elevation of about 450 ft. above the Atlantic, and about 200 ft. above Lake Ontario, and is surrounded by beautiful scenery. It flows into Lake Ontario through the Seneca and Oswego rivers, and is connected by canals with the Erie canal, with Keuka or Crooked lake near its W. border, and with the Chemung river. It is 630 ft. deep, and was never known to be frozen over till March 22, 1856. It is navigated by steamboats running from Watkins at the S. to Geneva at the N. extremity.

SENECA OIL. See PETROLEUM.

SENECAS, one of the five Iroquois nations in New York, W. of Sodus bay, Seneca lake, and Elmira. They called themselves Tsonnundawago, but received from the Dutch the name of Sinnekaas, which in time became Senecas. They were the hereditary doorkeepers of the cabin, and had eight sachemships, belonging to the Turtle, Snipe, Hawk, Bear, and Wolf families. When first known to the French they were bounded W. by the Attiwandaronk or Neuters on the Niagara, and the Erie S. of Lake Erie. By conquest the Scannonaerats, a nation of the Hurons, most of the Neuters, the Eries, and the Andastes or Susquehannas were successively incorporated with them. Chaumonot began a mission among them in 1657, followed by Fremin in 1668. They permitted La Salle to put up a block house at Niagara; they were afterward hostile, but were won over by Joncaire, and in 1712 permitted the French to build a fort at Niagara. When Pontiac formed his general league of tribes against the English, the Senecas alone of the Six Nations joined him, destroying Venango, attacking Fort Niagara, and cutting off an army train near Devil's Hole in 1763. In the revolution they sided with the English. Gen. Sullivan invaded their country, and, after defeating the allied tribes at Newtown, destroyed several towns, and ravaged the whole canton in 1779. They made peace at Fort Stanwix in 1784. Much of their lands were soon after ceded or yielded to speculators, including the preëmption right of what they still retained. In 1812, though earnestly solicited by their countrymen of the Six Nations in Canada, they formally declared against the English and rendered service to the American armies on the frontier. A part of the tribe settled at Sandusky and Stony Creek, Ohio, joined the hostile tribes in the west, but made peace at Spring Valley in September, 1815. This band ceded all but a reservation with the Shawnees in 1818, and in 1831 sold that and removed to the Indian territory on the Neosho. The Senecas in New York still occupy the Alleghany, Cattaraugus, and Tonawanda reservations (66,000 acres), but white settlers have encroached so that there are thriving towns there. The Senecas in New York in 1870 numbered 3,060; those in the Indian

territory 206. Protestant missions were begun among the Senecas in New York in 1805, and the society of Friends has done much to aid and protect them. Their most illustrious men have been the great orator Red Jacket (see RED JACKET) and Cornplanter. Portions of Scripture have been printed in the Seneca language, and a grammar and dictionary were prepared by the late Rev. Ashur Wright.

SENEFELDER, Aloys, the inventor of lithography, born in Prague, Nov. 6, 1771, died in Munich, Feb. 26, 1834. He was sent to Ingolstadt to study law, and while there occasionally performed in private theatricals, and in 1789 wrote a comedy, *Die Mädchenkenner*. On the death of his father, an actor, he tried unsuccessfully to be an actor and dramatist. Having learned something of printing, he experimented to invent a process of his own, and finally made by accident his great discovery. (See LITHOGRAPHY.) His first prints were some pieces of music. Subsequently he made important improvements, contrived a press, obtained a patent, and set up an establishment, which he carried on for some time successfully. In 1809 he was appointed inspector of the royal lithographing establishment at Munich. He published *Lehrbuch der Lithographie* (Munich, 1819; English translation, "Complete Course of Lithography," 4to, London, 1819).—See *Aloys Senefelder und der geistliche Rath Simon Schmidt*, by Nagler (Munich, 1862).

SENEGAL, a river of Senegambia in western Africa, formed in lat. 14° 10' N., lon. 10° 30' W., by the junction of the Ba-fing and the Ba-Woolima, and flowing thence N. W., W., and S. W. into the Atlantic ocean at Fort St. Louis, in lat. 16° 7' N., lon. 16° 30' W. The Ba-fing, which is regarded as the main stream, rises near Timbo, the principal town of the native state of Fouta Jallon, not far from lat. 10° 30' N., lon. 10° 45' W., in the Kong mountains; and if this be considered as its source, the total length of the river, which is exceedingly tortuous, is about 1,000 m. Between the 13th and 15th meridians, where the Senegal flows westward, it separates into three parallel branches, thus forming two long islands with a stream between them, each over 50 m. long and averaging 6 m. wide. It again becomes double before reaching the sea, into which however it flows as a single stream, 250 yards wide, over a shifting sand bar which will admit vessels of 12 ft. draught. The largest tributary is the Ba-Faleme from the south. The Senegal is navigable for river boats only in the wet season. There is a fall of 80 ft. a few miles below the mouth of the Ba-Woolima.

SENEGAL, an aggregation of French colonial settlements on the Senegal river and its tributary the Faleme, including the island and town of St. Louis at the mouth of the Senegal, and Goree, off Cape Verd; pop. estimated in 1874 at 100,000. The French have here attempted the system of military colonization applied in Algeria, with but limited success; and a con-

siderable portion of the territory claimed and to some extent occupied by them in this region prior to 1870 was abandoned in that year. In 1872 the value of the exports to France was 10,800,000 francs, and of the imports from France 6,400,000 francs, the commerce being almost exclusively in the hands of the French. The establishment is under a colonial governor, with a military and naval force under his command.—French trading posts were established in this region in the early part of the 17th century, and in the 17th and 18th centuries were controlled successively by the West India company, the Senegal companies, and the East India company. The English held them by conquest from 1758 to 1779, and from 1803 to 1814.

SENEGAMBIA, a region of western Africa, formerly comprising only the territory lying between the rivers Senegal and Gambia, from which it derives its name, but now held to include the whole of the country between the former river and the British colony of Sierra Leone. It is bounded N. by the Sahara, E. by Soodan, S. by Sierra Leone, and W. by the Atlantic, and extends from lat. 9° to 17° N., and from about lon. 10° W. to Cape Verd, in lon. 17° 34' W. Its eastern boundary is so indefinite that an accurate estimate of the area is impossible; it can hardly be less than 200,000 sq. m., and has been placed much higher. The population is estimated at 9,000,000. It includes the French colony of Senegal, and French power predominates on the coast and in the country. There are English settlements along the Gambia, of which Bathurst at its mouth is the principal town and the seat of government; and the Portuguese establishments at the mouth of the Rio Grande and in the interior in 1873 embraced a territory of 43 sq. m., with 8,500 inhabitants. The objects of these foreign establishments are purely commercial. The coast region of Senegambia consists of a belt of level land extending inland from 150 to 200 m., which in the north is for the most part open, sandy, low, and barren, with here and there a few rocky cliffs; but S. of the Gambia the aspect of the country changes, the vegetation becomes luxuriant, and the deeply and frequently indented coast is bordered by mangrove swamps, back of which rises a rich forest region. The principal rivers, described under their own titles, are the Senegal and Gambia, S. of which three others of considerable size empty into the Atlantic: the Casamanza or Casamanche, navigable 80 m. from its mouth; the Rio Grande, 400 m. long; and the Nuñez, of about half that length. With the exception of the coast and the alluvial flats along the rivers, the country is undulating, and rises in terraces from the ocean to the mountains of the interior, which overspread the S. E. portion, and attain an elevation variously stated at from 3,000 to 6,000 ft. Little is known of Senegambian geology, except the occurrence of granite in the mountainous region. Iron.

ore is abundant in the elevated districts, and gold is found in large grains lower down. The climate is reputed to be the most continuously hot of any in the world. The highest temperature is experienced in the vicinity of the Sahara, in the north, where the mercury sometimes rises to 110° F. in the shade; on the coast the average is about 80°. Throughout most of the country the rainy season lasts from June to December inclusive, and is characterized by tornadoes at midsummer, with thunder and lightning of tropical intensity. Much of the land is exceedingly fertile. In the forests are found the oil-producing palm and many valuable kinds of timber, gums, and caoutchouc; cardamoms, ground nuts, and cassia are also obtained, and indigo grows wild. Wild coffee also is abundant on the banks of the Nuñez. Rice, maize, and millet are the chief grains cultivated. Hemp is extensively grown. All the domestic animals of Europe are found, in addition to which there are camels in the desert country of the Jaloofs. Large numbers of cattle are raised on the pasture lands of the terraces. Elephants are very numerous, and the hippopotamus is found in all the rivers. Buffalo, deer, a species of eland, antelopes, wild boars, hares, porcupines, lions, panthers, and hyænas are all natives of the country. Crocodiles are numerous, and the boa frequents the marshy grounds.—The inhabitants consist of the aboriginal negro tribes, Moors, and the offspring of these two races, a people of middle size, of a light copper color, well made and active. Many of the women are remarkably handsome, and both sexes dress neatly. They are much more civilized than the black tribes, of which the lower type is found along the coast, while the Mandingoes, the Jaloofs, and others of this mixed descent dwell further inland, and live under regular governments, generally consisting of a king and hereditary nobility. They keep large numbers of slaves. The Mohammedan religion prevails among them. There are about 20 native states in the country. The most important of these is the Foola state of Foota Jallon, with its capital at Timbo, occupying an elevated plateau over 80 m. square, in the south, near the head waters of the Senegal. (See FOOTA JALLON.) The kingdom of Bondoo and the territory of Foota are described under their own titles, as is also the Mandingo country proper, which some include in Senegambia. Besides the trade carried on by the French, English, and Portuguese from their settlements upon the three rivers, which is mainly in palm oil, gum, hides, beeswax, ground nuts, and wild coffee, a considerable traffic exists between Senegambia and the countries lying further E. Much of the gold found in the elevated districts is carried to Timbuctoo, and thence finds its way to the countries N. of the Sahara.—The Carthaginians visited this part of the coast of Africa, and the Portuguese reached it between 1444 and 1469. The latter nation

formed several commercial establishments, but afterward neglected them when they discovered the route to India. The British acquired their possessions on the Gambia in 1631, and the French settled on the Senegal in 1637.

SENIOR, Nassau William, an English political economist, born at Uffington, Berkshire, Sept. 26, 1790, died June 4, 1864. He graduated at Magdalen college, Oxford, in 1811, and was called to the bar in 1819. From 1825 to 1830, and again from 1847 to 1852, he was professor of political economy at Oxford. From 1836 to 1853 he was a master in chancery. His works are: "Introductory Lectures on Political Economy" (1826); "On Foreign Poor Laws and Laborers" (1840); "Treatise on Political Economy" (1850); "A Journal kept in Turkey and Greece in 1857 and 1858" (1859); "American Slavery" (1862); "Biographical Sketches" (1864); "Essays on Fiction" (1864); "Historical and Philosophical Essays" (1865); "Journals, Conversations, and Essays relating to Ireland" (1868); "Journal kept in France and Italy in 1848-'52" (1871); and "Correspondence and Conversations with Alexis de Tocqueville" (1872). (See POLITICAL ECONOMY, vol. xiii., p. 672.)

SENILIS (anc. *Augustomagus*), a town of France, in the department of Oise, near the forests of Chantilly and Ermenonville, 20 m. N. N. E. of Paris; pop. in 1872, 6,085. The old town retains its feudal walls and 16 watch towers, and remains of a castle of the time of Louis XII., as well as vestiges of the Roman fortifications and other relics; and remains of amphitheatres were discovered in 1865. The church of Notre Dame was originally a cathedral, ascribed to Charlemagne. Cotton, crinoline, and other articles are made. The town is conspicuous in the history of various French wars. A treaty was concluded here in 1493 between the future emperor Maximilian and Charles VIII. of France, which settled the Burgundian inheritance.

SENNA (Arab. *sene*), a drug which consists of the dried leaves of several species of *cassia*, of the order *leguminosæ*. In the most familiar plants of this family, as the pea, locust, lupin, and others, the corolla is papilionaceous, and the stamens are united to form a more or less complete tube. In the genus *cassia* and its allies, the corolla is of distinct and spreading petals, with distinct stamens. The cassias which furnish senna are bushy shrubs, 2 to 4 ft. high, with unequally pinnate leaves, the leaflets of which are unequal at the base and in four to eight pairs; the yellow flowers are in erect axillary racemes, and the broad flattened pods contain six or more seeds. *C. acutifolia*, with ovate or lanceolate leaves, and *C. angustifolia*, with narrower and longer leaves, furnish most of the drug, which was in use as early as the 9th century, and still retains its popularity. The principal commercial varieties are the Alexandrian, produced by *C. acutifolia*, and collected in various districts of Nubia; the

Bombay or East Indian, from *C. angustifolia* of southern Arabia and various parts of India; and the Tinnevely, which is merely the last named species cultivated in India; the leaves



Cassia acutifolia. Plant reduced; leaf and pod of natural size.

of this are much larger, as the plant is more luxuriant. The gathering of the first two is done mainly at the close of the rainy season, in September; the bushes are cut and exposed to the sun until the leaves are quite dry, when they are separated by beating with sticks; the whole and broken leaves, the small stems, and the pods are sent to the place of export. Some of it is garbled to remove extraneous matters before it is shipped. Tinnevely senna, being a cultivated product, is collected with more care, and is a very superior variety of the



American Senna (*Cassia Marilandica*).

drug. Senna was formerly much more contaminated by foreign leaves than now; the poisonous *coriaria myrtifolia* of southern Europe was used to adulterate it; in Alexandria

senna argel leaves may be often found, but as this (*sarcostemma argel*) grows with the senna plants, it is supposed to be an accidental admixture. Senna is an active cathartic, and is largely used both by physicians and in domestic practice; it is usually given in infusion, but sometimes in the fluid extract, tincture, and confection. It contains two bitter principles, and a cathartic acid upon which its activity chiefly depends. The active principle is readily changed by long continual heat and exposure to the air; hence the infusion should always be made in a covered vessel.—American senna, or wild senna as it is sometimes called, is *cassia Marilandica*, a perennial herbaceous plant, which grows from New England southward and westward; the root produces numerous erect stems 2 to 4 ft. high, clothed with leaves which have six to nine pairs of lance-oblong, obtuse leaflets, the common petiole bearing at its base a conspicuous club-shaped gland; the bright yellow flowers are in axillary racemes, the two lower petals are the largest, and the anthers of the three upper stamens are deformed and imperfect; the fruit is a narrow, somewhat curved, hairy pod, 3 to 4 in. long. This is a very showy plant, and is now and then seen in gardens, though it is not so well appreciated here as it is in Europe. The leaves are gathered for medicinal use; they possess properties similar to those of the imported senna, but are less active, a third larger dose being required to produce the same effect.

SENNAAR, a country of Africa, forming part of the territory commonly known as Nubia, and now included in the aggregation of Nile provinces constituting the dependency of Egypt officially known as Soodan. It is bounded E. by Abyssinia and W. by Kordofan, and extends S. from the junction of the Blue and White Nile in lat. 15° 36' N. to about lat. 10°, but its boundaries are not well defined; area about 50,000 sq. m.; pop. 1,500,000. It consists chiefly of the peninsular territory lying between the Bahr el-Azrek or Blue Nile on the east and the Bahr el-Abiad or White Nile on the west, with its N. extremity at Khartoom. The chief towns are Khartoom, where the governor resides, Sennaar, the former capital, on the Blue Nile, and Wat Medineh, described by Sir Samuel Baker as the principal trading place on the same river. The country consists of a plain from 1,400 to 1,500 ft. above the sea. There are some isolated summits nearly 1,000 ft. above the surrounding country; and toward the S. boundary the surface becomes very mountainous. The plain of Sennaar rests upon a regular horizontal stratum of sandstone, and the mountains consist of crystalline rocks, clay slate, and limestone; while many of the isolated hills are composed of granite, and some contain veins of auriferous quartz and gneiss. Iron ore is abundant, and salt is found on the White Nile and at Khartoom. The soil of the plain is for the most part a rich black mould, though there are many

sterile and unproductive tracts. Rain seldom falls in the north, sometimes not for two or three years together; but in the south it is abundant between May and September. The climate is exceedingly hot, the thermometer rising to 120° in the shade. Extensive forests border the flat tracts along the White Nile, and in the lower part of the country where the river overflows its banks abundant crops of durra and beans are raised. These are the principal products, but wheat, cotton, and tobacco are also cultivated. Much of the country is well adapted for pasturage, and large numbers of horses, camels, sheep, goats, and cattle are raised. Among the leading exports are leather and cotton goods to the neighboring countries, ivory, ostrich feathers, and honey. The elephant, giraffe, rhinoceros, antelope, lion, leopard, hyæna, baboon, hippopotamus, wild boar, crocodile, heron, and ibis are met with. The inhabitants represent a number of races, and vary from light yellow to black. There are several Arab tribes, and the territory of the Dinkas embraces the S. W. corner of Sennaar. The better classes are generally well made and handsome, but about half the population are negro slaves. The people understand working in metals, and are good weavers and potters, and particularly skilled in leather making, which is their chief manufacture. Cotton stuffs are also made. Mohammedanism is the prevailing religion, but its requirements are little regarded, and there are many Christians and pagans in the S. E. part of the country.—Sennaar formerly belonged to Abyssinia, and was subsequently annexed to the government of Nubia, but appears to have achieved independence about the 14th century. Its history is imperfectly known, but there is reason to believe that during the last 200 years its territory has been parcelled out among various chiefs practically independent of one another. Since the invasion by Ismail Pasha in 1820-'22 Sennaar has been subject to Egypt.

SENNACHERIB. See ASSYRIA, vol. ii., p. 35.

SENS (anc. *Agendicum* or *Civitas Senonum*), a town of France, in the department of Yonne, on the right bank of the Yonne, 60 m. S. E. of Paris; pop. in 1872, 11,514. It is the seat of an archbishop, and has a museum of antiquities, an episcopal seminary, a theatre, and an ancient Gothic cathedral. Serge, druggets, dials, pottery, cutlery, and nails are manufactured.—In the time of Julius Cæsar Sens was one of the principal towns of the Senones, and subsequently as capital of Lugdunensis Quarta it was a focus of great Roman roads. It was strongly fortified and often besieged. It was taken by the allies, Feb. 11, 1814, after a brave resistance by the inhabitants.

SENSITIVE PLANT. See MIMOSA.

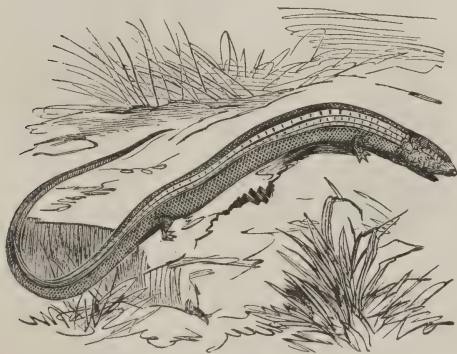
SEPIA, a pigment made from the black secretion of the *sepia* or cuttle fish, which it ejects when pursued or annoyed. This secretion was used as an ink by the ancients. Several

varieties of *sepia* yield the ink, but the *sepia officinalis*, common in the Mediterranean, affords the most, and is the one chiefly sought. The sac containing the secretion is extirpated, and the juice dried as soon as possible, as it quickly putrefies. Caustic alkalies render it soluble in water, but absorption of carbonic acid again precipitates the *sepia*. The dried native *sepia* is prepared for the painter by triturating with caustic lye, adding more lye, boiling half an hour, filtering, neutralizing with an acid, filtering, washing the filtrate, and drying it with a gentle heat. It has a beautiful brown color with a fine grain, and has given name to a species of drawing.

SEPOYS (probably from Pers. *sipahi*, a soldier), the native soldiers of the British army in India. The practice of employing the natives as troops originated with the French about the middle of the 18th century, and in 1748 the East India company organized a small body of sepoys at Madras, which had increased to 14 battalions, numbering 10,000 men, at the time of the battle of Plassey. Two of the battalions took part in the expedition under Clive, who at once began to form a similar native army in Bengal, which as early as 1765 contained 19,000 troops. A sepoy force was also raised in Bombay, which consisted of about 3,500 men in 1772; and in 1773, when the office of governor general was established, the estimated strength of the East India company's native army was 45,000 men. This entire military establishment was reorganized in 1796 on a basis which remained essentially unchanged till 1861. A native regiment was about 1,100 strong in Bengal, and 900 in Madras and Bombay; there were about 120 native non-commissioned officers, 20 native commissioned officers, and theoretically 25 European officers, but in fact only 12 or 15. The highest rank to which a native could attain was that of *subahdar* or captain; native lieutenants were known as *jemadars*, and sergeants as *havildars*. The sepoys were volunteer troops. Those of the Bengal army were mainly high-caste Hindoos, but in the armies of Madras and Bombay the aristocratic element was not so prominent. According to Kaye, the Bengal sepoy was to the outward eye the finest soldier, tallest, best formed, and of the noblest presence; but he was less docile and serviceable than the sepoy of the southern and western armies. Notwithstanding occasional local mutinies and murderous outbreaks on the part of the native soldiery, their discipline, fidelity, and good service in the field, extending through so many years, inspired an extraordinary and almost universal confidence in their loyalty, which existed throughout India up to the beginning of the great sepoy revolt in 1857. (See INDIA.) When it began, the East India company's army consisted of about 300,000 men, all sepoys with the exception of 40,000. The mutiny was almost wholly confined to the Bengal army; in Madras but a single regiment was

disaffected, and in Bombay none at all; while the native forces from the Punjaub assisted in repressing the rebellion. Upon the subsequent transfer of the army to the crown, a reorganization became necessary. This was effected in 1861, by a reduction of its numbers one half, the abolition of promotion by seniority, and the permanent appointment of seven effective officers to each regiment. The troops are nominally on the footing of irregulars. There are 137 battalions of infantry, 40 regiments of cavalry, and a few batteries of artillery. The number of men in 1873 was 128,447, of whom 103,343 were infantry.

SEPS (Daud.), a genus of saurian reptiles of the skink family, divided by modern authors into several subgenera. In the group the feet are very short, and have three or four toes, with claws; the apex of the tongue is notched, the eyes lizard-like with transparent lower lid; teeth numerous and conical; body snake-like, and the scales smooth and imbricated; no femoral pores. The four-toed seps (*tetradactylus Decresiensis*, Péron) has the nostrils in the nasal scute, and a conical tail about as long as, and hardly distinct from, the body; the color above is brownish spotted with black, the sides grayish with dark dots, and whitish below; it is about $5\frac{1}{2}$ in. long, the anterior limbs one fourth and the posterior five eighths of an inch; it is found in Australia and the neighboring islands. The three-toed seps (*hemiergis Decresiensis*, Dum. and Bibr.) is distinguished from the last chiefly by the number of the toes, of which the central is the longest; the color and habitat are the same; the length is about 4 in., the anterior limb $\frac{1}{2}$ in., and the posterior about half as long. The common seps (*seps tridactylus*, Merr.) has a



Seps tridactylus.

more elongated body and shorter limbs, and the nostrils are between the nasal and rostral scutes; the feet are three-toed. The color is bronze above, usually with four longitudinal darker stripes, and greenish white below; the number of stripes and the black and white markings vary; the length is 16 in., the anterior limbs $\frac{2}{3}$ in. and the posterior $\frac{1}{2}$ in. It is

viviparous, and is found in southern Europe and northern Africa; the food consists of worms, small land mollusks, spiders, and insects. An allied species (*heteromeles Mauritanicus*, Dum. and Bibr.) of N. Africa has only two toes on the fore feet; it is grayish white dotted with black above, and whitish below; the length is $4\frac{1}{2}$ in., the anterior limbs $\frac{1}{2}$ in. and the posterior $\frac{1}{2}$ in.

SEPTEMBER (Lat. *septem*, seven), the ninth month of the year, but the seventh with the early Romans, their year beginning with March, as the legal year did in England until the change of style in 1752. The name is still retained in most European languages, like those of the three succeeding months, notwithstanding their present inaccuracy. The Anglo-Saxons called it *Gerstmonath*, or barley month; and in Switzerland it is still called *Herbstmonat*, harvest month. It has 30 days.

SEPTIMIUS SEVERUS. See SEVERUS.

SEPTUAGINT. See BIBLE, vol. ii., p. 613.

SEPULVEDA, Juan Ginez de, a Spanish historian, born at Pozoblanco, near Cordova, in 1490, died in 1574. He assisted Cardinal Cajetan at Naples in the revision of the Greek Testament, in 1529 went to Rome, and in 1536 was appointed chaplain and historiographer to Charles V. He wrote a work justifying the wars and acts of the Spaniards in America, which was never printed. He also wrote histories of Charles V. and Philip II. (whose education he had superintended), and a narrative of the Spanish conquests in Mexico. His works have been published by the royal academy of history at Madrid (4 vols. 4to, 1780).

SEQUANA. See SEINE.

SEQUATCHIE, a S. county of Tennessee, intersected by the Sequatchie river, a tributary of the Tennessee; area, about 250 sq. m.; pop. in 1870, 2,335, of whom 175 were colored. The surface is very hilly and the soil moderately productive. The chief productions in 1870 were 12,472 bushels of wheat, 13,010 of Indian corn, 6,905 of oats, 9,353 lbs. of tobacco, and 5,904 of wool. Iron and other valuable minerals abound. Capital, Dunlap.

SEQUIN (Ital. *zecchino*, from *zecca*, the mint), an old Italian and Turkish gold coin. It was first struck at Venice about the end of the 13th century, and afterward in all the other Italian cities, and by the Levant trade introduced into Turkey. The Tuscan sequin is worth \$2.313; the Turkish varies according to the date of coinage.

SEQUOIA, the botanical name of a genus of large coniferous evergreen trees, consisting of but two species, both of which are natives of our Pacific coast. The name was imposed by Endlicher, who left its derivation unexplained, but it has since been maintained that it was given in honor of the Cherokee Sequoyah or George Guess. (See GUESS.) The species first made known was the redwood of the Californians, *S. sempervirens*, which was discovered by Menzies in 1796, and from imperfect

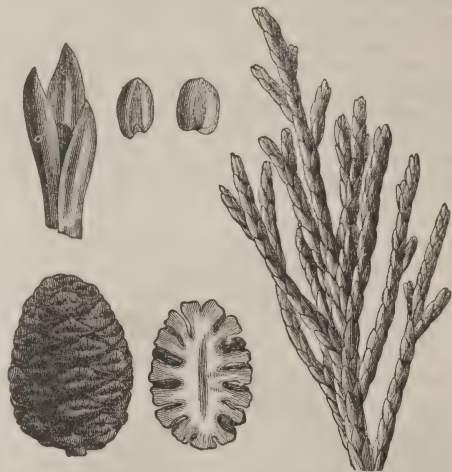
specimens was referred to *taxodium*, the genus of our deciduous cypress. Endlicher found that it did not belong to the cypress subfamily, but that its affinities were with the pines and



Redwood (*Sequoia sempervirens*). Male and Female Flowers.

cedars; its awl-shaped or linear leaves are scattered, or somewhat two-rowed; its flowers monœcious, terminal and solitary; sterile aments globular, on slender stalks; the cones oval or globular with woody shield-shaped scales, beneath each of which are three to seven winged seeds. The redwood has leaves half an inch to an inch long, two-rowed, flat, dark shining green above and glaucous beneath; as is the case with many other conifers, the leaves of the redwood are quite unlike in the young tree, where they are spreading, to those on the older trees, where they are closely appressed. The cones are an inch or more long, roundish, with thick roughish scales, each of which has a strong obtuse point. The tree is found from the boundary of Mexico northward, its northern limits being not well ascertained, and never very far from the coast; upon the Coast range of mountains it often forms forests to the exclusion of all other timber. It sometimes reaches a diameter of 15 ft. and a height of 300 ft.; 1,008 annual rings have been counted upon a slab taken from a tree 15 ft. through. The redwood has been of more value to the settlers in California than perhaps any other tree, the forests being near the ocean, though in many cases they have been found so inaccessible that it was cheaper to purchase lumber brought from Oregon than to transport redwood from the rugged hills only a few miles distant; the timber is light and close-grained, but not very strong; it much resembles in appearance that of the red cedar, but is darker; it splits with remarkable facility, and in some localities has been largely used for fencing; it may be made into planks and boards without the use of a saw; being

eminently durable, and not attacked by insects, it is used for building purposes and for cabinet work; it is said to dry without shrinking.—The second and only other species of *sequoia* is *S. gigantea* (Torrey), popularly known as the "great tree of California," and the "mammoth tree," and the groves of which are generally called "the big trees." This species was first discovered by some miners, who in prospecting came upon what is now known as the Calaveras group; afterward the Mariposa and Fresno groups were discovered, and later Prof. William H. Brewer made known the existence of extensive forests of the tree along the western flanks of the Sierra Nevada. The California botanists early secured specimens of the tree and forwarded them to Drs. Torrey and Gray, proposing, should it prove to be a new genus, to call it *Washingtonia*; the specimens were lost upon the way; about the same time an English collector, Mr. Lobb, sent incomplete materials to England, and Lindley named it as a new genus, *Wellingtonia*. In 1855 Dr. Torrey received very complete materials, and found that the tree belonged to the already established genus *sequoia*, and published it as *S. gigantea*. The English still retain *Wellingtonia* as their name for the tree, and some of their leading botanists, while admitting that the tree is *sequoia*, so far ignore



Mammoth Tree (*Sequoia gigantea*). Leaves reduced, with three of natural size; cone and section, half size.

the rules of nomenclature as to call it *S. Wellingtonia*. Books of California travel have made the trees of this species well known, and until the recent discovery of Australian eucalypti as large if not larger, they were regarded as the most gigantic of vegetable productions; 30 ft. is not an unusual diameter, and some have measured 33 and 36 ft., and with their buttresses even more in diameter, and their heights are estimated at 275 to 450 ft. A striking peculiarity of these trees is the disproportion between the expanse of the foliage

and the size of the trunk. It is now known that the trees grow with astonishing rapidity when young, but after they have reached their maturity (something over 1,000 years) they



Group of Mammoth Trees.

make but little growth. The bark, often 15 in. thick, is of a brown or cinnamon color, and the wood is similar to that of the redwood; when oiled and exposed to the light it becomes of a very deep mahogany color. This species differs from the redwood in its shorter leaves of a light glaucous green, and its larger ovate cones, the scales of which have each a slender prickle. The cultivation of both species has been tried in the eastern states, but without encouraging success; specimens that gave great promise have one after another succumbed either to severe winters or to mildew, and they have both failed entirely, at least north of Virginia. In England they flourish remarkably well, and *S. gigantea* has made a growth remarkable for any tree, and especially rapid for a conifer, and it will probably prove important for planting in forests. (See CALIFORNIA, vol. iii., p. 606.)

SEQUOYAH, an unorganized S. W. county of Kansas, intersected by the Arkansas river; area, 720 sq. m. The surface is elevated, and consists chiefly of rolling prairies.

SERAGLIO. See CONSTANTINOPLE.

SERAING, a village of Belgium, in the province and 3 m. S. W. of the city of Liège, on the right bank of the Meuse; pop. in 1866, 19,414,

against 2,000 in 1820. It has mines of iron and coal, and is the seat of the works established in 1816 by John Cockerill, and now managed by a company, producing locomotives, steamboats, and all kinds of machinery.

SERAMPORE, a town of British India, in the Hoogly district of Bengal, on the W. bank of the Hoogly 13 m. N. of Calcutta, with which it is connected by rail; pop. about 15,000. It extends about a mile along the river, and is well built and clean. Serampore was a colony of Denmark from 1676 to 1845, when it was purchased by the English. The first Baptist mission in Hindostan was established here, and here also was published the first native newspaper, printed by the missionaries from 1818 to 1823. The principal industry of Serampore is the manufacture of paper.

SERAPIS, or **Sarapis**, an Egyptian divinity, whose worship prevailed in the reign of the Ptolemies. The name is supposed to be a compound of Osiris and Apis, or a conversion of the name Osir Hapi given to the dead Apis. The worship of Apis, but little developed in the time of the Pharaohs, became in another form of primary importance under the Ptolemies. According to Plutarch and Tacitus, Ptolemy I., warned by a dream, sent to Sinope for a colossal statue, which on its arrival at Alexandria was declared to represent the god Serapis. The temple Serapeum was built at Alexandria for the reception of the statue, and was the last hold of the pagans in that city after the introduction of Christianity. It was a magnificent structure, supported by arches, and divided within into spacious apartments. It was destroyed by the bishop Theophilus, by order of Theodosius, in 389; and "the colossal statue of Serapis was involved in the ruin of his temple and religion." Canopus was the seat of a shrine and oracle of Serapis. The worship of Serapis prevailed for a short time in Rome in A. D. 146, under Antoninus Pius, but was soon suppressed on account of its licentious character. At Puteoli (Pozzuoli) there was a Serapeum, the ruins of which were uncovered in 1750, and are regarded as among the most remarkable remains of ancient architecture in Italy. In 1850 Mariette discovered the site of the Serapeum or Apis mausoleum at Memphis. It has now been completely unearthed. It is divided into three distinct parts; one served as the burial place of the sacred bulls from Amunoph III. of the 18th dynasty to the end of the 20th dynasty; another comprises the tombs of the Apis until the end of the 25th dynasty; and the third, which is the best preserved, those of the time till the later Ptolemies. Nearly 200 sphinxes have been laid bare, and the inscribed tablets which covered the walls, numbering about 500, have been removed to the Louvre.

SERAYEVO. See BOSNA-SERAI.

SERBATI. See ROSMINI SERBATI.

SERF (Lat. *servus*, a servant or slave), a term descriptive of the condition of a large portion

of the people of Europe in the middle ages and in later times. Slavery and various forms of bondage prevailed throughout the whole of the Roman empire, and slavery was known to some of the races by whom that empire was overthrown; and out of the social and political conflicts produced by the barbarian invasions of the empire arose the feudal system. (See FEUDAL SYSTEM.) The invaders found a portion of the agricultural populations of the countries they acquired in a condition between servitude and freedom. These were the *coloni*, or bond laborers, who were attached to estates. Under the German conquerors of Gaul, where the feudal system experienced its greatest development, and where serfdom became the most extensive and severe in its application to the masses of the people, labor was almost entirely servile and compulsory. Some lords possessed more than 20,000 slaves each. The capitulary *de Villis* shows that the royal farms were cultivated by slaves, and it is estimated that they embraced a fourth part of the land. In time the benefices that were granted became heritable, so that the beneficiary exercised over the slaves not merely the power of an owner, but also that of a magistrate. Montesquieu asserts that at the beginning of the ascendancy of the third dynasty, in the 10th century, nearly all the people of France were serfs. The extreme sufferings of the people from famine compelled many of them to sell themselves into slavery; others exchanged liberty for the protection of powerful men. Offenders against the laws, who could not pay the compositions demanded of them, and persons who had failed to perform their military duties, were made serfs, or were liable to be so made. Some men voluntarily became the property of churches and monasteries. The effect of the barbarian conquests had been on the whole advantageous to the slaves found in the conquered countries, though it had considerably depressed the *coloni*. The two classes of forced laborers had been brought nearer together, the more favored class suffering somewhat from the change, while the less favored class gained a little therefrom. For several centuries this state of things lasted, to the detriment of the *coloni*, or villeins, as they were called by the juriconsults. The effect of the establishment of the feudal system, on the other hand, was beneficial to both the serfs and villeins. Chattel slavery ceased to exist, and they could no longer be bought and sold. This was principally owing to the influence of the church, which denounced traffic in Christians. The serfs became hereditary bondmen, and were employed on the soil, with which they were transferred. The difference between the serfs and the villeins, however, was so faint in many respects that they are generally spoken of as forming one and the same class, even by the highest authorities. But the distinction was real, the villeins holding a medium position between the serfs and the ingenuous classes, or freemen. The serfs, who are some-

times spoken of as a lower class of villeins, were in theory in the most abject state, and practically they often were so. Beaumanoir, after pointing out the two conditions of gentlemen and freemen, says: "The third estate of men is that of such as are not free; and these are not all of one condition, for some are so subject to their lord that he may take all they have, alive or dead, and imprison them whenever he pleases, being accountable to none but God; while others are treated more gently, from whom the lord can take nothing but customary payments, though at their death all they have escheats to him." The former were serfs, the latter villeins. The villein was obliged to remain upon his lord's estate. He could not sell his lands, and his person was bound, and he could be reclaimed and brought back if he left his superior. This was the condition of both serfs and villeins; but the former were bound to the performance of ignoble services, from which the latter were exempt. It was only against his lord that the villein was without rights, at least in England; and "he might inherit, purchase, sue in the courts of law, though, as defendant in a real action or suit wherein land was claimed, he might shelter himself under the plea of villenage." Children generally followed the condition of their mother, but in England the state of the father determined that of the children as far back as the reign of Henry I., the first third of the 12th century. There the law presumed that the fathers of the bastards of female villeins were free, or that bastards were the sons of nobody, and therefore could not be the sons of slaves. In France, the free woman who married a serf was treated as being of her husband's condition; and in Flanders, if a free man married a villein, he became a villein himself after living with her a year. Before the establishment of the feudal system, and under the Carlovingian rule, it had been provided that a free man who had taken a villein to wife could divorce her if he had been deceived as to her condition. Villeins could not marry without their lord's consent, or they forfeited their property, or were fined. The treatment of the servile classes differed much in different countries, and villenage literally disappeared from England long before it was broken up in France. It was never abolished by statute. —In France, the rise of men from a servile condition began very early and continued until great changes were effected. Many of the *coloni* aspired to freedom at the time when the feudal system was in its most flourishing state, and not a few of them were successful in throwing off their bonds. Those on the estates of kings and churchmen were soonest enabled to do this, for obvious reasons. By the middle of the 13th century so many villeins had become possessed of fiefs, that even St. Louis, who favored the rise of the people, became alarmed, and sought to put a stop to the practice. But he did not take from them the fiefs

they had acquired, which has justly been held to prove that the number of such fiefs was large, and the class of emancipated *coloni* too numerous to be assailed. Louis X., in 1315, emancipated all persons in the royal domains upon their paying a fair composition, his object being to set an example to all seigneurs; but his example was not extensively followed. Philip the Fair had emancipated the villeins on the royal domains in Languedoc, but the number of freemen was always greater in southern France than in the north, except in Normandy. One of the chief effects of the crusades was to favor emancipation. Previously the obstacles in the way to emancipation were almost insurmountable. The labor of the villeins was very valuable to their lords, and a lay noble "was unable to enfranchise the serf without the concurrence of each in turn of the various other lords who, in the long chain of feudal dependence, might have an interest, mediate or immediate, or more or less remote, in the fief to which the serf belonged." To emancipate a serf on an ecclesiastical estate would have been to alienate a part of the church's property, and that property was inalienable according to the canon law. The crusades operated to change this, as military service was incompatible with the servile condition. The serf who took the cross became free, not through the force of positive law, but because opinion was so strong in his favor that his owner durst not reclaim him, either while in service or after his return. The crusades, too, by introducing unwonted habits of change of place, greatly increased the numbers of those vagrants whom the law had previously presumed to be serfs, and assigned to the lord on whose property they remained beyond a year and a day, unless they acknowledged themselves to be the property of some other lord. The crusaders were soldiers of the cross, and it would not answer to deal with them as slaves. It was allowed to vagrants to declare themselves the king's vassals, and such vassals were free. Further, this movement of the people caused great additions to be made to the populations of the communes, and the gates of the communes stood constantly open to refugees; and whoever resided therein for a year and a day, being a serf at the beginning of that term, became a free man. No serf could be a *bourgeois*, for in the citizens of a bourg resided, collectively, its seignury; and a serf could not hold seignorial rights. But when the serf who had taken refuge in a bourg had acquired freedom, he became a citizen on easy terms. Before the crusades these bourgs had become so many places of refuge to men of servile condition; and the crusades led to the great increase of the number of such fugitives, promoted commerce, and created new sources of wealth, which things were favorable to freedom. Nevertheless, serfdom was not abolished throughout France until the French revolution, and serfs could not be manumitted without letters patent from the king. It was

a French rule of law, and as such put in practice concerning foreigners as early as the 13th century, that whoever entered France, being a slave, became free; but the practice of the country was very different toward the masses of the natives. That terrible insurrection known as the *Jacquerie*, which occurred in 1358, shortly after the battle of Poitiers, was caused by the sufferings of the people at the hands of the seigneurs, though its immediate occasion was the additional suffering created by the English wars. The fierceness of the peasants afforded an excuse for keeping them in a subordinate condition; and from that time the progress of emancipation became slow. The triumph of the central power, too, was injurious to the servile classes, as the kings no longer had occasion to favor the people at the expense of the nobles. From the closing years of the 14th century, therefore, the condition of the French people ceased to be directly affected by those causes which previously had tended to their elevation; but general causes to that end still remained in operation, and at least prevented their condition from becoming worse.—In Italy the people had become free by the 13th century; and in some of the German countries the peasants acquired their freedom before the close of the 18th, but in other parts of the country they remained in a condition of modified villenage until the present century.—In England the state of most of the laboring people was on the whole, and comparatively speaking, mild down to the time of Henry II. (1154-'89). The *villani* of Domesday Book were the *ceorls* of Anglo-Saxon law; and in the second generation after the Norman conquest the villen was mentioned as a freeman. But in the next generation he became completely dependent upon the lord, and his general condition was very harsh, though somewhat mitigated by the existence of legal fictions, and by opinion. "This class," says Hallam, "was distinguished into villeins regardant, who had been attached from time immemorial to a certain manor, and villeins in gross, where such territorial prescription had never existed, or had been broken. In the condition of these, whatever has been said by some writers, I can find no manner of difference; the distinction was merely technical, and affected only the mode of pleading." Gradually the condition of the English villeins was improved, until the system silently disappeared. By the middle of the 14th century there were many peasants who had become free laborers, and who worked for wages. The English villeins of that time shared in that general aversion to servitude which led the *Jacques* to rise in France, and the rebellion that takes its name from Wat Tyler was of substantially the same nature as that in which Guillaume Callet figured, though the English revolt was a quarter of a century later than the French. From the close of the 14th century the tendency to the abolition of English

villanage was very strong. The last unequivocal evidence as to its existence is believed to be a commission of Elizabeth, dated 1574, directing the enfranchisement of her bondmen and bondwomen on certain manors, upon payment of a fine; but no doubt it existed somewhat later than that period.—The Polish peasantry were enslaved by the nobles, though they were never chattel slaves; and among the causes of the fall of Poland was the serfdom that there existed. After its last partition the condition of the Polish peasants underwent various modifications under the Prussian, Austrian, and Russian governments, until emancipation, though at different periods, was decreed in each division. In Hungary, the last remnants of serfdom were abolished by the laws of 1848. In Russia, serfdom was unknown till the end of the 16th century, though chattel slavery had long existed there. Serfdom was introduced by Boris Godunoff, and in a few years all the rural populations were subject to it, with the exception of those persons who resided in the free communes constituting the crown domains. The legislation of Peter the Great transformed the serfs on private estates into a condition of chattelhood, while those on the royal domains enjoyed comparative freedom; but as great grants of land and serfs were made by the Russian sovereigns to individuals, myriads of peasants were thus converted into serfs of the lowest grade. Alexander I. and Nicholas were friendly to the liberation of the peasants; and Alexander II. soon after his accession began his labors in the cause of emancipation, proposing to free all the serfs, but gradually. He encountered considerable opposition, and long preparations were unavoidable; but on March 3 (Feb. 19, O. S.), 1861, the "imperial manifesto" emancipating the serfs was published, to take effect at the end of two years. Serious difficulties were anticipated from the opposition of the nobles and the ignorance of the serfs; but the manifesto was carried out with little disturbance. (See RUSSIA.)

SERGEANT, John, an American jurist, born in Philadelphia, Dec. 5, 1779, died there, Nov. 23, 1852. He graduated at Princeton in 1795, became distinguished as a lawyer, and between 1815 and 1842 served six terms in congress. In 1826 he was one of the two envoys appointed to represent the United States in the Panama congress. In 1832 he was the whig candidate for vice president with Mr. Clay. A volume of his "Select Speeches" was published at Philadelphia in 1832.

SERGIPE, a maritime province of Brazil, the smallest in the empire, bounded N. by Alagoas, from which it is separated by the Rio São Francisco, E. by the Atlantic, and S. and W. by Bahia; area, 12,240 sq. m.; pop. in 1871, 275,000. It has a coast line of 130 m., with few indentations and no good harbors. The shore in the southern half is mostly low and sandy; in the northern there are scattered hills. The

E. part of the province is called the *mattas*, from its forests, which produce valuable timber, and are here and there separated by cultivable land; the western, called the *agrestes*, is mostly a barren waste, with some portions fit for pasturage in the rainy season. The latter region is the higher, and somewhat mountainous, the principal range being the low Serra d'Itabayana. Besides the São Francisco, there are several small rivers falling into the Atlantic, none of them navigable by small craft for more than 27 m. from the sea. In the shore region the climate is hot and the soil fertile, yielding large crops of cotton, sugar cane, tobacco, mandioca, rice, and millet; some flax is produced, and mangoes and oranges abound. The exports include cotton, sugar, tobacco, rum, and ipecacuanha. The number of schools reported in 1875 was 149, with a total attendance of 5,247. Capital, Aracajú, near the mouth of the Cotinguiba river.

SERINAGUR, a city of India, capital of Cashmere, by which name it has also sometimes been called, in lat. 34° 6' N., lon. 74° 55' E., near the centre of the valley of Cashmere, 5,246 ft. above the sea, 170 m. N. N. E. of Lahore; pop. about 135,000. It extends about 4 m. along both sides of the Jhylum, which is crossed by five wooden bridges, and winds through the town as a deep and placid stream about 100 yards wide. The exterior appearance of Serinagur is picturesque and attractive. From its delightful situation and innumerable canals it has been called the Venice of Asia; but within it is for the most part extremely filthy. The houses, which are generally dilapidated, are built of thin bricks with timber frames, many of them three stories high. The principal public buildings are the Jumna Masjid, or great mosque, in which it is said 60,000 persons can worship together, and the dungeon-like palace of the maharajah, surmounted by a shining cupola. On the east is a lake 5 m. long and 2½ m. broad, known as the Dal of Serinagur, which is connected with the Jhylum by a canal, is surrounded by beautiful scenery, and was formerly a favorite resort of the Mogul emperors, many of whose pleasure grounds and palaces still remain; the most noted is the Shalimar Bagh, laid out by the emperor Jehanghir, which Moore selected for the closing scene of "Lalla Rookh." This lake is celebrated for its floating gardens, formed by placing layers of soil on tangled masses of aquatic plants, where the finest melons and cucumbers are cultivated. Serinagur is the centre of the shawl manufacture of Cashmere. Silk is also raised and manufactured.

SERINGAPATAM (Hindoo, *Sringa-patna*), a city of India, in Mysore, 7 m. N. E. of the city of Mysore, 2,412 ft. above the sea; pop. about 13,000. It is on the upper end of an island, about 3 m. long, in the Cavery river, and was strongly fortified under native rule. The more prominent buildings are a Hindoo temple, a handsome mosque, the mausoleum of Hyder

Ali and Tippoo Sahib, and the ancient palace of the rajahs of Mysore. Seringapatam first appears historically in 1610 as the capital of a Mysore chief named Raj Wadegar, and was unsuccessfully besieged by the Mahrattas in 1697. In 1765 Hyder Ali established his government there, and a Mahratta army again attacked the city in 1772 and forced him to a humiliating peace. During the reign of Tippoo Sahib, in 1792, it was invested by a large British force under Lord Cornwallis, who exacted a war indemnity of £3,300,000 from the native monarch, together with the cession of about half his dominions to the English and their allies. In 1799 Seringapatam underwent a celebrated siege. It was invested by the British and the allied forces of the nizam, about 31,000 strong, under Gen. Harris, on April 6, and was stormed and captured on May 4, after four days' bombardment, and a loss to the British of 1,164 killed and wounded. The assault was led by Gen. Baird, and Col. Wellesley, afterward duke of Wellington, participated in it. Tippoo Sahib was killed, and 929 pieces of ordnance, together with enormous amounts of treasure and jewels, fell into the hands of the victors; £1,100,000 in prize money was divided among the troops. In 1809 the discontent with the management of the Madras army led to a mutiny of the European officers stationed at Seringapatam, who fired upon the royal troops, but subsequently submitted. Seringapatam is now included within the Ashtagram commissionership of Mysore.

SERPA-PINTO, A. A. See supplement.

SERPENT, a musical wind instrument of curvilinear form, consisting of a conical tube of brass, divided into three parts, a mouthpiece, neck, and tail, and having six circular apertures for the production of the notes. Its compass extends from B flat below the bass staff to G, the treble clef line, and its use is confined to military bands. It was invented by Edme Guillaume of Auxerre in 1590.

SERPENT, or **Snake**, the common name of the ophidian reptiles, including, according to the earlier naturalists, all air-breathing oviparous vertebrates, of elongated and rounded body, without limbs and creeping on the ventral surface. The body is very flexible and narrow, without distinct neck and with conical tail; bones of the face movable, making the mouth very dilatable; teeth sharp, separate, usually hooked on both jaws and almost always on the palate; no eyelids, nor tympanum, nor apparent external auditory foramen; skin extensible, protected by thin scales covered by an epidermis which is shed in a single piece by a process of inversion; the plates of the under surface are larger, and used for progression; the male reproductive organs are double, concealed, and capable of protrusion, which has led some to the belief that snakes have posterior limbs; they are oviparous, and a few are ovoviviparous, and the young undergo no metamorphosis after leaving the egg. The

spine consists of very numerous and movable vertebrae, concave in front and hemispherically convex behind, distinguishable only into costal and caudal; the occipital condyle is single, and the jaws are connected by a very movable interarticular bone; the very numerous ribs are always distinct and free at the lower end, there being no sternum nor pectoral arch. The tongue is soft and fleshy, protractile, deeply forked, and held in a sheath; the visceral organs are very long, closely fitting in the abdominal cavity; only a single lung well developed, generally the left, forming a cavity with spongy walls, and the hinder portion frequently without cells, its simple sac serving probably as a reservoir of air; opening of the cloaca transverse. The vertebrae are rarely fewer than 100, and in some boas and pythons as many as 400, presenting the largest number among animals; progression is almost always by lateral undulations, the ribs with their attached ventral plates being so many pairs of feet, like those of myriapods, in some boas more than 300 pairs; the anterior limbs are wanting, but in some boas and pythons there are horny hooks appearing externally, supported on a rudimentary pelvic arch; with these few exceptions posterior limbs are wanting. Most of the muscles are specially adapted for acting on the spinal column, and are arranged in a very complicated manner, especially those in connection with the ribs. The brain is small, and the spinal cord very long, with exceedingly numerous vertebral nerves. For other details of structure see **COMPARATIVE ANATOMY**, and **REPTILES**. They creep, spring, climb, swim, constrict, suspend themselves by the tail, burrow, and raise the body almost erect. Like most reptiles, they are very sensitive to cold, becoming lethargic in winter; the muscular irritability is remarkably great and persistent, depending on the spinal nervous agency and the inherent property of the muscular tissue; the heart palpitates long after it has been removed from the body, and the jaws open and shut in the decapitated head. The senses of smell, hearing, and taste are very imperfect; the eyes, without lids and constantly open, appear immovable; the principal seat of touch is in the soft and extensible tongue. The scales offer every variety of color and marking, but in most the general color resembles the objects on which they habitually live; the coloring matter is in the middle layer of the skin, the inner or dermis being strong and holding the scales, and the outer or epidermis shed several times a year; the animal is dull and does not eat at the period of casting its skin. These characters are sufficient to distinguish serpents from large annelids, eel-like fishes, the scincoid and chalcidian saurians, and many elongated batrachians; they are reptiles in the true sense of the word. For the systems of classification see **HERPETOLOGY**; they are generally divided into the two groups of the venomous and non-ven-

omous; the first, like the cobra, rattlesnake, and viper, have movable fangs in the upper jaw communicating with a poison gland. All feed on living prey, which is swallowed whole; while some are rapid in pursuit, others crush their victims to death, or poison them, or bring them within reach of their jaws by a kind of fascination, terrifying by their hideous and menacing aspect some of the active and smaller mammals and birds into a momentary loss of power. They eat and drink rarely, and are capable of sustaining very long fasts; digestion is performed very slowly; the secretion of the large salivary glands is profuse. For details on the poison apparatus see COBRA DE CAPELO, RATTLESNAKE, and VIPER. The stomach is little more than a prolongation of the œsophagus, and the intestines are very short; the heart is in a fibrous pericardium, and consists of two auricles, and one ventricle with two unequal apartments communicating with each other; hence a mixed arterial and venous blood is sent over the system; the growth is slow, and the life prolonged; the hissing attributed to serpents is a faint sound produced by the slow escape of air through the mouth or nostrils during expiration, and only exceptionally would be noticeable by an indifferent observer; the animal heat is low. The males are smaller, more slender, brighter, and more active than the females; no nest is made, there is no incubation (except in the python) by the heat of the body, no food is stored up for the young, and no education nor parental care is necessary. The mother hides the eggs in a suitable place, and leaves them to be hatched by the heat of the sun and air; sometimes the young are brought to maturity in the mother's body, as in the vipers. There are about 1,000 described species, widely distributed over the world, especially in the warmer regions; doubtless many varieties from age, sex, and climate have been described as species.—Fossil remains of serpents have been found in all the divisions of the tertiary age; *palæophis* (Owen), attaining a length of 20 ft., has been found in the eocene of England, showing a higher temperature than now exists in N. Europe; many more species, probably belonging near the genus *coluber* (Linn.) if not in it, are met with in the middle and upper tertiary and the diluvium of Europe. Prof. Marsh describes in the "American Journal of Science" (1870) the *dinophis grandis* from the New Jersey tertiary greensand, a vertebra of which indicated an animal 30 ft. long, allied to the present marine boas. Almost all the species older than the post-pliocene are related to the constrictors. He draws attention to the fact of the occurrence of closely related large serpents in the same geological formations in Europe and in this country, just after the disappearance of the snake-like mosasaurus and its allies, interesting in view of the probable derivation of the serpents. Other large species have since been described in

the same journal.—For interesting information on serpents, see Broderip's "Note Book of a Naturalist," part 13, and F. Buckland's "Curiosities of Natural History" (London, 1859).

SERPENTINE. See MARBLE, vol. xi., p. 147.

SERRANO, Francisco, duke de la Torre, a Spanish statesman, born at San Fernando, near Cadiz, in 1810. He entered the army when still a boy, and took part in the war against the Carlists. In 1843, during the contest between the partisans of Maria Christina and Espartero, he espoused the interests of the former, and was one of the junta of Barcelona which declared the majority of Queen Isabella and deposed Espartero. After the restoration of Maria Christina he joined Narvaez in overthrowing the ministry of Olózaga. In 1846 his extraordinary influence over the queen, whose lover he was, led to dissensions between her and her husband, and caused much scandal; and the ministry of Sotomayor attempted to remove him from court, but was overthrown by him. The Pacheco-Salamanca ministry, which he supported, fell before public opposition; and Serrano then, as an offset to the rising favor of Narvaez, caused the recall of Olózaga and Espartero. On the advent of Narvaez to power in 1849, Serrano was made captain general of Granada; and he afterward vigorously opposed in the senate the ministries which rapidly succeeded each other. In February, 1854, he was implicated in an insurrectionary movement at Saragossa, and exiled, but was restored by the revolution of July, and joined the "liberal union" which supported the coalition of Espartero and O'Donnell; and when they separated, Serrano declared for the latter. He had been made in 1854 captain general of artillery, which office he exchanged some time later for that of captain general of New Castile. Madrid being thus under his control at the time of O'Donnell's *coup d'état* in July, 1856, he suppressed the insurrection in the Prado and the Retiro, and soon afterward superseded Olózaga as ambassador to Paris, but was recalled on the fall of O'Donnell in October. On his return he joined in the senate the opposition which led to the downfall of Narvaez in November, 1857. In 1860 he was appointed captain general of Cuba, and was succeeded by Dulce, Dec. 11, 1862. On his return to Spain he was created duke de la Torre for his services in the reannexation of Santo Domingo to Spain in 1861. In June, 1865, he was made captain general of Madrid. On the return of Narvaez to power in 1866, Serrano as president of the senate, with Rios Rosas, president of the deputies, presented a protest against the prorogation of the cortes, and in consequence was imprisoned for a short time at Alicante. In the revolution of 1868 he took a prominent part. With other generals he had been exiled to the Canary islands in July, but the revolutionists sent a vessel for them, and they landed on Sept. 19 at Cadiz. At the head of the insurgents Serrano

defeated the government troops at Alcolea, Sept. 23, and entered Madrid on Oct. 3. The junta made him president of the council and commander-in-chief of the army; and in February, 1869, with the consent of the cortes, he assumed the executive power. The new constitution was promulgated in June, and on the 15th, by a vote of the cortes, Serrano became regent. He resigned that office on the arrival of Amadeus to take the throne, Jan. 2, 1871, and was made prime minister. In April, 1872, he was appointed to the chief command of the forces sent against the Carlists, with whom he concluded in May the convention of Amorovieta; and on his return he succeeded Sagasta as head of the ministry. His concessions to the Carlists in the late convention were the cause of much popular dissatisfaction, but the cortes passed a vote of approval. The insurrection however was still active; the republicans also threatened armed opposition; and in the difficulties which beset Amadeus, Serrano suggested that the ministry should have the power to suspend the constitutional guarantees when they should deem it necessary. Amadeus refused; Serrano and his cabinet resigned, and he was succeeded by Zorrilla. After the proclamation of the republic following the abdication of Amadeus (Feb. 11, 1873), Serrano was conspicuous in the opposition to the new government, in April became implicated in a seditious movement, and fled from the country. With the restoration of quiet he soon returned, and in February, 1874, after the *coup d'état* by Pavia, which followed the resignation of Castelar's administration, he was elected by the cortes president of the republic. He almost immediately placed himself at the head of the army against the Carlists, whom he engaged with varying success till May, when he returned to Madrid. In August he obtained a recognition of his government and the republic by Great Britain, France, and Germany, in September resumed command of the army against the Carlists, and in January, 1875, retired from office on the proclamation of Alfonso XII. as king of Spain.

SERTORIUS, *Quintus*, a Roman general, born at Nursia, in the country of the Sabines, about 121 B. C., assassinated in 72. He distinguished himself in the campaign of Marius against the Cimbri and Teutons, was tribune in Spain under the prætor Didius, joined the party of Cinna and Marius upon his return, and when Marius was driven from Italy raised fresh troops with Cinna and upheld the fortunes of the party. In the subsequent triumph of Marius, Sertorius was the only one of his adherents who exhibited any moderation of conduct; and so strongly was he incensed by the excesses committed at this time, that after the death of their chief he put to the sword 4,000 slaves who had been the body guard of Marius, and had perpetrated every possible crime against the citizens. When Sulla returned to Italy in 83, Sertorius obtained the post of proconsul of

Spain, where he governed with justice. An army having been sent against him by Sulla, he was forced after a temporary success to cross into Africa, where, joining the native princes, he defeated Sulla's general Paccianus. Returning to Spain, he placed himself at the head of the Lusitanians, and defeated the four Roman generals who held possession of the greater part of the country. His design was to found an independent power in Spain, in which the native Spaniards should enjoy equal rights with the Roman settlers. He gained the affection of the inhabitants, and impressed them with a superstitious awe by means of a white fawn which he pretended had been given to him by Diana. The Roman senate at length sent Pompey with a large force against Sertorius, and the first battle took place near Sucro. The force under the command of Perperna was beaten by the Romans under Metellus; but the Romans under Pompey were beaten by Sertorius, and Pompey himself was wounded. Pompey was a second time beaten on the plains of Saguntum, and compelled to withdraw beyond the Pyrenees. Reënforced from Rome, he began a second campaign, but through the summer of 73 failed to bring Sertorius to battle or to gain any material advantage. An offer was finally made of 100 talents and 20,000 acres of land to any Roman citizen who should kill Sertorius; and he was slain by conspirators at a banquet to which he had been invited by his own general Perperna.

SERVAL (*felis serval*, Linn.), a carnivorous animal of the cat family, a native of southern Africa. It is about 4 ft. long, of which the tail is 15 in.; the color above is ochrey yellow, darkest on the back, and shading into white on the under parts; body with dark brown spots forming longitudinal marks on the neck and shoulders; inside of fore legs with two transverse black bands; tail tipped and



Serval.

ringed with black. The legs are rather long, the body slender, the head small and rounded, and the hair long and shaggy, especially on the flanks. It is about the size of the lynx, and preys upon the smaller mammals and birds; it is not very savage, and the young are gentle like the common cat.

SERVANT. See MASTER AND SERVANT.

SERVETUS, *Michael*, a Spanish author, born at Villanueva, near Saragossa, in 1509, burned at

the stake in Geneva, Oct. 27, 1553. His proper Spanish name was Miguel Serveto. He studied law at Toulouse, but having become a disbeliever in the Trinity, he removed in 1530 for safety to Basel. In his 22d year he published *De Trinitatis Erroribus* (Hagenau, 1531), for which he was banished from Basel. In 1532 he published at Hagenau *Dialogorum de Trinitate Libri duo: de Justitia Regni Christi Capitula quatuor*, in which he defended his former book, and advanced a new heresy concerning the eucharist. Changing his name on entering France to Michel de Villeneuve, he devoted himself for some years to the study of medicine in Lyons (where he also worked as a corrector of the press), and afterward in Paris. He was at the university of Orleans in 1534. In 1535 he edited the works of Ptolemy with Latin notes. In the next year he graduated M. D. at Paris, and soon became celebrated as a lecturer on medical science. He divined the true method of the circulation of the blood, and with this and other conjectures in physiology anticipated Harvey and Hunter. In 1537 he published *Syruporum Universa Ratio*. He established himself at Charlieu, near Lyons, in 1538, and in 1540 removed to Vienne in Dauphiny, where he lived for several years in the palace of his former pupil the archbishop. He revised a new edition of the Bible, founded upon the manuscripts of Sanctes Pagninus, which was put under the ban of the church; and gathered the materials for *Christianismi Restitutio*, the manuscript of which was completed in 1546, and sent to Calvin for corrections and suggestions. But the Genevan reformer retained it, and freely accused the author of heresy in letters to others of the Reformed clergy. The work was printed at Vienne in 1553, and the author was arrested and imprisoned for trial. On April 7 he escaped in disguise and reached the frontier; but his trial went on, and he was sentenced to pay a heavy fine and be burned by a slow fire. The edition of his book was destroyed, only three copies being saved. Servetus, on his way to Naples, stopped at Geneva for a month, and at the instance of Calvin was arrested. On Aug. 14 he was brought before the municipal court, accused of heresy, of publishing seditious books, of disturbing the churches, of escaping from the lawful authority, and of insulting the ancient fathers and the living divines of the Protestant church, especially Calvin. On the following days new charges were added, of Anabaptism, of pantheism, of contempt of the Bible, and of materialism. Though the result of the trial could not be doubtful, it was agreed that the matter should be submitted to the decision of the Swiss churches. A paper containing 38 articles was drawn up by Calvin, and, with the answers of Servetus annexed, was sent to the various churches. The opinion of all was that Servetus should be condemned as a heretic, while they differed as to the severity of the

punishment. In the final council of 60 summoned in October, the discussion lasted three days, but in the end the extreme party prevailed. The execution took place on a hill a short distance from the city. No exhortations could induce Servetus to retract, and his last words were a repetition of his heresy. His books and the manuscript which he had sent to Calvin were burned with him. Servetus had no disciples while living, but after his death the name of "Servetists" was fixed as a stigma upon the Swiss Anabaptists, and accepted by a small party who rejected the doctrine of the Trinity.—His life has been written by Mosheim (Helmstedt, 1750), Tréchsel (Heidelberg, 1839), and W. H. Drummond (London, 1848). See also Brunnemann, *M. Servetus* (Berlin, 1865).

SERVIA (Slav. *Serbia*; Turk. *Syrrp*), a state of Europe, tributary to Turkey, bounded N. by Slavonia and Hungary proper, E. by Wallachia and Bulgaria, S. by districts of the vilayets of Prisrend and Bosnia known as Old or Turkish Servia, and W. by Bosnia; area, 16,817 sq. m.; pop. in 1873, 1,338,505, all Serbs, of Slavic origin, excepting about 140,000 Wallachs, 25,000 gypsies, and 15,000 Turks, Bulgarians, Jews, Germans, and Hungarians. The surface is broken by ramifications of the Carpathians in the northeast, of the Balkan in the southeast and south, and of the Dinaric Alps in the west. The highest summits in the east and south reach an altitude of upward of 4,000 and 5,500 ft. respectively. Most of the mountains are covered with dense forests. In the centre and along the banks of the principal rivers are extensive plains. The Danube and its tributary the Save flow on the N. frontier (the former for some distance also on the eastern), and receive the drainage of the country by several streams, the most important of which are the Drina, Morava, and Timok. The principal towns are Belgrade, the capital, Kraguyevatz, Semendria, Uzhitza, and Shabatatz. The climate is severe in the uplands, but mild in the valleys; in winter the thermometer generally ranges between 6° and 14° F. The low grounds are very fertile, and cereals are raised in abundance; good white wine is produced near Semendria; tobacco, hemp, fruit, and some cotton are raised; but horses, cattle, sheep, and swine are the principal sources of wealth. The exports, including grain, skins, wool, cattle, and especially hogs, amounted in 1872 to \$6,000,000, and the imports, chiefly salt, sugar, and manufactured goods, to about the same. Valuable minerals abound, but are not fully worked. Manufactures consist mainly of articles for home consumption. The powder, firearms, and accoutrements required for the army are made in the government works at and near Kraguyevatz. Complete freedom of commerce is guaranteed in the Ottoman empire.—The Serbs are among the most spirited of the Slavic races. There is no nobility, and the peas-

ants are free householders. Community of interests prevails among the laboring classes, who live together under the authority of a chief or "father of the house," of their own selection. The Greek religion is that of almost all the inhabitants, and there is a synod consisting of the metropolitan at Belgrade and three bishops. Secession from the church is rigorously prohibited; but Roman Catholics (about 5,000), Protestants (400), and Jews (1,500) enjoy religious liberty. Education in the higher branches is better provided for by the government than in the lower by the communes, and in the elementary schools is free and obligatory. The academy of Belgrade was made a university in 1869.—Servia pays to Turkey an annual tribute of 2,300,000 piasters, and has enjoyed since 1834 a perfect autonomy, which was confirmed by the treaty of Paris of March 30, 1856, and guaranteed by the European powers. The right of garrisoning Belgrade and other fortresses was finally relinquished by the Porte in 1867. In 1872 a postal treaty was made with Roumania. Commercial treaties were concluded with Russia and Austria in 1874, and Servia established her own coinage in 1875. There are Servian diplomatic agents at Constantinople and Bucharest, and many foreign consular and diplomatic agents reside in Belgrade, the national capital. The government is a limited monarchy, vested in a hereditary prince of the Obrenovitch dynasty, who appoints responsible ministers. The original charter dates from 1838. The latest revised constitution, that of 1869, converts the senate, consisting of 17 life members appointed by the government, into a permanent council of state, and vests legislative power solely in the *skupshchina* or assembly (the origin of which is traced back to the earliest period of Servian history), and provides for its annual meetings at Kraguyevatz. In 1874 the *skupshchina* consisted of 184 members, 101 elected by the people for three years, and 33 appointed by the government. A so-called great *skupshchina*, with about 500 members, assembles in the event of a vacancy on the throne, or in other extraordinary emergencies. Suffrage is universal for all Christian Servians 21 years old and over, who pay direct taxes; only menials and gypsies are disfranchised. All electors are eligible to the *skupshchina* excepting members of the government and of the clergy. The prefects of the 17 circles and the 54 districts are appointed by the government, and the presidents of the communes, who are at the same time justices of the peace, are elected by the people. There are superior courts of law in each circle, besides a court of appeal at Belgrade. The courts are all public, and the independence of the judges is guaranteed by the constitution. The military forces comprise a standing army and a national army (militia). The second forms the nucleus of the military organization; the standing army is only employed on ordinary garrison duty and in train-

ing the national army for war. All able-bodied men must serve between the ages of 20 and 50; the period of service in the standing army is three years, and in the national army 27. The officers of the national army are trained at a central military college, and the non-commissioned officers and men in district schools and shooting grounds. The strength of the standing army is about 12,000 men (divided into garrison troops and reserve), and of the national army (first and second levies) 150,000.—The original inhabitants of Servia were chiefly Thracians. Conquered by the Romans during the early period of the empire, Servia formed part of Illyricum under the name of *Moesia Superior*. During the great migration of nations it was overrun by the Huns, Ostrogoths, and other barbarians, and subsequently was under Byzantine rule from the middle of the 6th till early in the 7th century, when it was devastated by the Avars. The latter were driven out by the Serbs, a Slavic people, who had been living N. of the Carpathians, and whose aid the emperor Heraclius (died 641) had invoked. He allotted to them the depopulated regions, and introduced Christianity. Servia remained a vassal state of the emperors of the East; but a spirit of liberty was fostered by powerful and well organized local governments, whose chiefs (*zhupans*) repeatedly attempted to make themselves altogether independent. But the imperial authority was fully restored in the latter part of the 9th century by Basil I., surnamed the Macedonian. Subsequently the Bulgarians held the ascendancy in Servia for a long period, but their power was broken by John Zimisce, and finally destroyed by Basil II. in 1018. Stephen Bogislas was the first Serb to found an independent principality, about 1043; his son Michael (1050-'80) styled himself king (*kral*), and was recognized by the Roman see. Stephen's grandson Bodin (1080-'90) extended his dominions, but was captured by the Byzantines, with whom his successor Vulkan or Vuk made peace in 1094. Urosh I. joined (1127-'9) the Hungarians against the Greek emperors, laying the foundation of repeated alliances with Hungary; and the contests with Constantinople continued under his successors. Stephen Nemanja, grandson of Urosh II., founded a new dynasty in 1165. He conquered Bosnia and other territories, and made Rassa (now Novibazar) his capital, from which his realm was called the Rascian, but could not cope with the emperors of Constantinople. His son Stephen I. was crowned in 1217 as king of Servia, and his successors acquired much additional territory. The most illustrious of them was Stephen Dushan (1336-'56), who had himself crowned czar. He conquered nearly all Macedonia, Albania, Thessaly, northern Greece, and Bulgaria, and greatly improved the laws, learning, and trade. But conflicts among the governors of his provinces undid his work, and most of his conquests

were lost by his son, King Urosh V., whose assassination in 1367 closed this dynasty. He was succeeded by the waywode (governor) Vukashin, who fought with the Greeks against the Turks, and conquered Salonica in 1369, but was defeated and fell in battle in 1371. Lazarus I. in 1374 established a new dynasty by conquering most of the Servian dominions. In 1389 he was defeated by Amurath I. on the high plains of Kosovo, and executed by order of the sultan, who had received a mortal wound from the hands of a brother-in-law of Lazarus. His son and successor Stephen, first as a vassal and then, in conjunction with the Hungarians, an adversary of Turkey, died in 1427 without issue, and was succeeded by his nephew George Brankovitch. He combated his son-in-law Amurath II., together with John Hunyady, who, after repeated victories, was vanquished in October, 1448, also on the plains of Kosovo. The sultan Mohammed II. completed the conquest of Servia in 1454, but in 1456 was compelled by Hunyady to raise the siege of Belgrade, a year before the death of Prince George of Servia. The latter's son Lazarus II. obtained the succession by poisoning his mother and expelling his two brothers. He died in 1458, the last and the worst of his dynasty. In 1459 Mohammed II. incorporated Servia with Turkey, excepting Belgrade, which was held by the Hungarians until taken by Solymán the Magnificent in 1521. The Turks resented the heroic resistance of Servia by sending 200,000 of her citizens into captivity, and by exterminating whole families, while others emigrated to Hungary; and rapacious pashas ruled abominably for several centuries, and reduced the country almost to a wilderness. Austria received Belgrade and most of northern Servia at the close of her war with Turkey in 1718, but the peace of Belgrade (1739) restored the Turkish domination, and the Serbs were again subjected to dire calamities, especially by the excesses of the janissaries. Their repeated applications for redress remaining unheeded at Constantinople, the people at length rose against the Turks, and Czerny George, a peasant, became in 1805 a successful leader of the revolt, and in 1807 was recognized as chief of the Servians by the sultan. (See CZERNY GEORGE.) After the treaty of Bucharest of 1812, Servia was deserted by Russia and France, and in 1813 the Turks again became masters of the country. But in 1815 Milosh Obrenovitch put a final end to their absolute domination. The stepbrother of Milan Obrenovitch (son of Obren), whose name he assumed, he began life as a grazier, but subsequently became one of the most valiant officers of Czerny George, and in 1813 showed so much firmness that the Turks left him in charge of several districts and at the head of several thousand men, in the hope that he would reconcile the people to their rule. But he awaited only an opportunity for its overthrow, and finally on Palm Sunday, 1815, gave

the signal for an insurrection. He defeated the Turks repeatedly, and secured in 1816 a partial independence for Servia; and after being head of the provisional government, he was elected hospodar or prince in November, 1817, and subsequently recognized by the sultan. He incurred the hostility of former chiefs, and attempted in vain to allay agitation by adopting in 1835 a liberal statute and the *code Napoléon*. Russia and Turkey concocted a new statute, which the sultan promulgated, Dec. 24, 1838, in the form of a *hatti-sherif*, instituting a senate, the members of which could not be displaced without the sultan's consent. This body was chiefly composed of Milosh's enemies, who brought charges of peculation against him, it being known that he had large estates in Wallachia and Austria, besides vast funds deposited in Vienna. He was compelled to abdicate, June 13, 1839, in favor of his son Milan, who died on July 7 and was succeeded by Milosh's younger son Michael. Soon after assuming the government he incurred the hostility of the Turks by banishing their most zealous partisans, Vutshitch and Petronievitch, who in 1842 headed an insurrection against him, which resulted in his ignominious defeat. He was driven from Servia on Sept. 7, his dynasty was deposed, and Alexander Karageorgevitch, a son of Czerny (or Kara) George, was elected prince, Sept. 14. His complacency toward the Turks during the Crimean war secured their assent to the placing of Servia, by the treaty of Paris of 1856, under the collective protection of the European powers; but at the same time he made himself odious in Servia for having invoked Turkish assistance for the punishment of his enemies, and Turkish protection in the citadel of Belgrade against his own countrymen. He was deposed Dec. 23, 1858, and Milosh, though almost an octogenarian, was reinstated. He died Sept. 26, 1860, and Michael again became reigning prince. After the disturbances at Belgrade in 1862, Michael obtained in 1867 the withdrawal of the Turkish garrisons from this and all other fortresses. He was assassinated June 10, 1868. (See ALEXANDER KARAGEORGEVITCH.) Prince Michael married Julia Hunyady, but had no children, and had adopted as his son his nephew Milan (born in Jassy, of a Moldavian mother, Aug. 22, 1854), who was educated in Paris (1864-'8), and was elected prince July 2, 1868, as Milan Obrenovitch IV. The sultan, fearing the alleged preference of Russia for the prince of Montenegro as ruler of Servia, not only at once recognized him, but also acknowledged for the first time the hereditary rank of the dynasty. A regency of three members, of whom the minister Blagnavatz, who had chiefly promoted his election, was the chief, conducted public affairs during his minority (1868-'72). Turkey had in 1834 restored six Servian districts which she had retained since 1813, and in the spring of 1872 she relinquished a

few additional localities, though not all which Serbia claims as her own. The majority of Prince Milan was declared on Aug. 22, 1872. His relations with Turkey were complicated in the summer of 1875 by the outbreak of the insurrection in Herzegovina, which excited in Serbia a strong sympathy. The seat of the legislature, which had always been at Kragujevatz, was in October removed to Belgrade. At the first session held in the latter city (Oct. 4) the prince declared himself, contrary to the wishes of the *skupstina*, opposed to a war with Turkey, and appointed a new cabinet in harmony with his conservative views, thereby impairing his popularity.—See Ranke, *Die serbische Revolution* (Hamburg, 1829; 2d ed., 1844); Milutinovitch, *Geschichte Serbiens von 1389–1815* (Leipsic, 1837); Cunibert, *Essai historique sur les révolutions et l'indépendance de la Serbie depuis 1804 jusqu'à 1850* (2 vols., Leipsic, 1855); Hilferding, *Geschichte der Serben und Bulgaren* (Bautzen, 1856); the Rev. W. Denton, "Serbia and the Servians" (London, 1862); Elodie Lawton Mijatovics (William Tweedie), "History of Modern Serbia" (London, 1874); and Saint-René Taillandier, *La Serbie au XIX^e siècle*, Kara George et Milosch (Paris, 1875).

SERVIAN LANGUAGE AND LITERATURE. The Servian language forms, together with the Russian and Bulgarian, the eastern stem of the Slavic languages. In the wider sense of the word, in which it is frequently called the Illyrian or Illyrico-Servian, it comprises the languages of the Serbs proper, the Croats, and the Sloventzi or Vinds. The first of these dialects is spoken by the Serbs in the principality of Servia and in Hungary (in which country they are called Rascians), by the Bosnians, Herzegovinians, Montenegrins, Slavonians, and Dalmatians; the second in the Austrian province of Croatia; the third in the Austrian provinces of Styria, Carinthia, and Carniola. Those Serbs who belong to the Greek church use the Cyrillic alphabet, while those belonging to the Roman Catholic church (comprising chiefly the Dalmatians, Croats, and Sloventzi) have adopted the Roman alphabet. Among the Dalmatians, in former times, the Glagolitic alphabet was in use. (See GLAGOLITIC.) Altogether, according to an estimate of Schafarik, the Servian language is spoken by about 7,250,000 persons, of whom more than 4,500,000 live under Austrian, more than 2,500,000 under Turkish, and about 100,000 under Russian rule.—There are in the Servian language four declensions of substantives and two of adjectives; the dual number has become extinct; the instrumental and the locative cases are found as in other Slavic idioms. The comparative of the adjective is formed by annexing a syllable, generally *yi*; the superlative by prefixing a syllable to the comparative (*nay*). The verb, which is inflected after three conjugations, lacks a subjunctive, which is supplied by circumlocution, and a

passive, which is expressed by means of a special participle. The tenses are the present, the future, the imperfect (with iterative signification), and the preterite. Of the prepositions, some govern the genitive, others the dative or accusative, and the accusative and locative, others the accusative and instrumental, others the genitive and instrumental. The Servian surpasses all the other Slavic idioms in euphony, and has often been called the Italian of the Slavic family of languages. The language of the eastern Serbs has received many Turcisms, but they have not affected its essential structure. The best grammatical work on these languages is the Servian grammar (in the Servian language) by Vuk Stefanovitch Karajitch, of which Jacob Grimm published a German translation (Berlin, 1824) with an excellent introduction. Other scientific grammatical treatises are those of Danicic, *Srpska grammatika* (3d ed., Belgrade, 1863) and *Srpska sintaksa* (1868). A grammar of the Croat language was published by Berlic (Agram, 1842), and another in Latin by Budmani (Vienna, 1867); one of the Dalmatian by Babukie (German translation by Fröhlich, Vienna, 1839). Of the language of the Sloventzi we have a grammar from Kopitar (Laybach, 1808). A dictionary of the Servian language has been published by Karajitch; an Illyrian-German and German-Illyrian dictionary by Richter and Ballmann (2 vols., Vienna, 1839–'40); a German-Illyrian by Mazuranic and Uzarevic (Agram, 1842); and a Croat by Drob-nitsch (Graz, 1852). An extensive Serbo-Croat dictionary is now (1875) in course of preparation by the South Slavic academy of sciences in Agram.—The Serbs who belong to the Greek church had no literature in their own language until the middle of the 18th century. Their writers used the Old or Church Slavic, which however was generally mixed with the popular dialect. The most ancient remnants of this style reach back to the 11th century, and consist principally of documents, diplomas, acts of government, &c., a collection of which was published at Belgrade in 1840. Among the most ancient writers of Servia are Stephen, the first king of Servia (crowned in 1217), who wrote the history of his father; his brother, Archbishop Sava (died 1237), who wrote monastic rules and other works; Domentian (about 1263), who wrote biographies of saints; and especially Archbishop Daniel (1291–1338), the author of the chief work on the ancient history of Servia, called *Rodoslov* ("Genealogical Register"). Count Pucic has collected and published the records, deeds, and laws of the period in his *Monumenta Serbica* (Vienna, 1858) and *Srbski spomenici* (Belgrade, 1858–'62). Of great importance also are the statutes of King Stephen Dushan (1336–'56). The Gospels were printed in Belgrade in 1552. During the following two centuries the only work of note was a "History of Servia," from the origin of the people until the reign of the

emperor Leopold I. of Germany, by Brankovitch (1645-1711). A partial revival began in 1758, when a Slavic press was founded at Venice. The archimandrite J. Raitch (1726-1801) gained a lasting reputation by his "History of the Slavs" (4 vols., Vienna, 1792-'5). But the first who undertook to write a work in the popular dialect was Dosithej Obradovitch (1739-1811), a monk, who for 25 years had travelled all over Europe, and at his death was senator and instructor of the children of Czerny George. His complete works were published at Belgrade in 1833 in 9 vols. Demetrius Davidovitch from 1814 to 1822 edited at Vienna the first Servian newspaper, and Vuk Stefanovitch Karajitch (1787-1864) fixed the present Servian alphabet, and reduced the language to certain general rules and principles. His collection of the Servian popular songs (4 vols., Vienna, 1814-'33) drew the attention of foreign nations to their beauty. In Germany, a general interest in them was excited by Goethe, Talvi (*Volkslieder der Serben*, 2 vols., Halle, 1825-'6), J. Grimm, and others; and many translations have since been published. In England some of the songs have been made known by Bowring and Robert Bulwer ("Owen Meredith"). Among the best modern Servian writers are Simeon Milutinovitch, author of a national epic, *Serbianka* (Leipsic, 1826), describing the Servian war of 1812, and of a history of Servia during the years 1813-'14 (Leipsic, 1837), and Archbishop Mushitzki of Carlovitz, whose works were published at Pesth in 1838. The chief seats of Servian literature are Pesth, Neusatz, and Belgrade. The last named city now has several newspapers, and a university in which law, philosophy, and the sciences are taught. There is also a Servian society of savants, formed in 1847, and reorganized in 1863 with the title of *Srpsko utcheno drustvo*. Collections of the popular poetry of Montenegro have been published by Tchubar Tchoikovitch. —Among the Roman Catholic Serbs, the Dalmatians had as early as the 12th century an interesting literature. An old chronicle of 1161, written in Slavic by a priest of Dioclea, is still partly extant in the original, and wholly in a Latin translation. Toward the close of the 15th century the city of Ragusa became an Illyrian Athens, and produced many distinguished authors, especially poets. The Ragusan and Dalmatian dialects which appear in their literary productions were very similar to the Servian as purified by Karajitch, and through the study of these ancient poets and the labors of L. Gaj, editor of an "Illyrian National Gazette" at Agram, the literary language of almost all the Serbs is now very much the same, though still written partly with the Cyrillic instead of the Roman alphabet. In the beginning of 1868, 14 political, 5 literary, 2 agricultural, 3 pedagogic, and 2 religious periodicals were published in the Servian language. —A good account of the history of Servian

literature, in English, is given in Talvi's "Historical View of the Languages and Literature of the Slavic Nations" (New York, 1850). See also Schafarik, *Geschichte der südslawischen Literatur* (Vienna, 1863-'4).

SERVICE BERRY. See JUNE BERRY.

SERVICE TREE (formerly spelled *servise*, from Lat. *cerevisia*, beer, a fermented drink having been made from the fruit), a European tree belonging to that section of the genus *pyrus* which includes the mountain ashes. The true service tree, *P. sorbus* (or *sorbus domestica*), is barely hardy in England; it is most abundant in France and Italy, and occurs in northern Africa and western Asia. This and the mountain ash were placed by Linnaeus in the genus *sorbus* (Lat. *sorbere*, to drink down, in allusion to their use for making a beverage), and they are sometimes in England called sorbs; but later botanists, finding that the chief difference between these trees and the apples and



Service Tree (*Pyrus sorbus*).

pears consisted in the former having compound leaves and flowers in broad cymes, included them all in the genus *pyrus*. The service tree is long-lived, some specimens being thought to be 1,000 years old; it grows from 20 to 60 ft. high, with a large pyramidal head; the bark is smooth except on old trees, where it is rough and full of cracks; the leaves have six or more pairs of serrate leaflets, with an odd one; the flowers are cream-colored, and the fruit, which is much larger than in any of the mountain ashes, is when ripe greenish brown, with a reddish tinge; eight or more varieties of fruit have been described, but the principal ones are the apple-shaped and pear-shaped, both about the size of a common gooseberry. Its chief value is in its wood, which is considered to be harder and heavier than that of any other European tree, weighing when dry 72 lbs. 2 oz. to the cubic foot, having a compact grain and reddish tinge, and taking a very fine polish; when not properly seasoned it twists

and splits badly; it is much used for screws to wine presses, cogs to wheels, rollers, pulleys, and rules; and for the coarser kinds of engraving it is one of the best substitutes for box wood. The fruit is sometimes eaten, but only when it is ready to decay; when recent it is very acid and austere; its use to make a fermented drink is mentioned by both Virgil and Pliny; in Brittany a cider or perry is made from it which is said to be good, though having a very unpleasant smell.—The wild service tree of England is *P. torminalis*; and the name is sometimes given to the European and the American mountain ash, *P. aucuparia* and *P. Americana*. (See ASH.)

SERVITES, or **Servants of the Virgin Mary**, an order of monks in the Roman Catholic church, founded in Florence in 1233 by seven patrician Florentines. Their main object was to propagate devotion to the Virgin Mary. They lived at first as hermits, but soon became a monastic community under the Augustinian rule. They were approved in 1255 by Pope Alexander IV., founded establishments in every state of western Europe, and were ranked as a mendicant order by Pope Martin V. In 1593 a branch of the order, under Bernardino di Ricciolini, adopted the original eremitical mode of life. The Servites have produced a large number of distinguished men, among whom may be mentioned St. Philip Benizi (died 1285), one of the apostles of western Europe in the 13th century, and Fra Paolo Sarpi. There were also female Servites, who were never very numerous, and a large body of Tertiarians. (See TERTIARIANS.) The order in 1870 was divided into 27 provinces, the central house being the monastery of the Annunziata in Florence. They were subsequently involved in the decrees suppressing religious orders in Italy and Germany. They were introduced into the United States in 1870 by Bishop Melcher of Green Bay.

SERVIVS TULLIVS, the sixth king of Rome, reigned from about 578 to about 534 B. C. According to the legendary accounts of his life, he was brought up in the palace of Tarquinius Priscus. One day, while he was asleep, flames appeared about his head, and Queen Tanaquil prophesied that he would do great things. He grew up in high favor with the king, and received in marriage one of his daughters. The sons of Ancus Marcius, fearing that he would be made heir to the throne, put the king to death; but Tanaquil declared that Tarquinius was not mortally wounded, and caused Servius Tullius to rule in his name. Servius not long after assumed the sovereign power. He added to the city the Viminal, Esquiline, and Quirinal hills, divided the people into tribes, classes, and centuries, and made a new constitution which was designed to give political independence to the commons. His regard for their interests awakened the jealousy of the nobles, and a horrible tragedy was the consequence. His two daughters were

married to the two sons of Tarquinius, and both wives and husbands being of unlike natures, Lucius Tarquinius secretly killed his wife, and married his sister-in-law Tullia, who had murdered her husband. Lucius then plotted with the nobles against the king, and in the summer, when the commons were gathering their harvests, entered the forum with a band of armed men, and seated himself on the throne before the doors of the senate house. Some of his followers slew the king on the way toward the Esquiline hill, and left his body in the road, where the chariot of his daughter Tullia was driven over it. Many of the incidents of this reign are unquestionably fabulous. The constitution, which is historical, was swept away entirely during the succeeding reign. What are called the walls of Servius Tullius were the walls of Rome down to the time of the emperor Aurelian.

SESOSTRIS. See EGYPT, vol. vi., p. 462.

SESTERCE (Lat. *sestertius*), an ancient Roman brass or silver coin, worth a quarter of a denarius, or originally $2\frac{1}{2}$ asses, whence its name (*semis tertius*, the third a half, the Roman expression for two and a half); but the denarius being early divided into 16 instead of 10 asses, the sesterce became equal to 4 asses. Its value down to the time of Augustus was 4.1 cents, and afterward 3.6. The *sestertium* was 1,000 sesterces, and large sums were often counted in sestertia. There was a common formula for the expression of that value in thousands, as: *SS*, 1,000 sestertia; *bi*na *SS*, 2,000; *de*na *SS*, 10,000; and *centena SS*, 100,000.

SESTOS, or **Sestus**, in antiquity, the principal city of the Thracian Chersonesus (now peninsula of Gallipoli), on the Hellespont, opposite Abydos, from which it is distant about 1 m. Though never large, it was important from its position. Its chief celebrity is from its connection with the romantic story of Hero and Leander, the former of whom was a priestess in the temple of Venus at Sestos. The western end of the bridge by which Xerxes crossed the Hellespont was a little S. of Sestos; and from its port the army of Alexander sailed over into Asia. Its site is now called Yalova.

SET, or **Typhon**. See DEMONOLOGY, vol. v., p. 794.

SETI I. and II. See EGYPT, vol. vi., pp. 461-2.

SETON, **Elizabeth Ann**, founder of the sisters of charity in the United States, born in New York, Aug. 28, 1774, died at Emmetsburg, Md., Jan. 4, 1821. She was the daughter of Dr. Richard Bayley, and in her 20th year became the wife of William Seton, whom she accompanied to Italy in 1803. After his death in Pisa she returned to New York, and entered the Roman Catholic church March 14, 1805. The ruin of her husband's fortune having left her dependent on her own exertions, she opened a school in Baltimore; but having received \$8,000 from the Rev. Samuel Cooper, and being joined by her two sisters-in-law, Harriet and Cecilia Seton, with two other la-

dies, they assumed the religious habit, Jan. 1, 1809, at Emmetsburg, and opened there a conventual establishment on July 30. In 1812 the sisterhood numbered 20 members, and chose Mother Seton as superior general, which post she occupied till her death. In 1814 they took charge of an orphan asylum in Philadelphia, and in 1817 were incorporated by the legislature of Maryland. In the latter year they took charge of an orphan asylum in New York, and thenceforward their increase kept pace with the spread of the Roman Catholic church in the United States. The community numbered 50 members at the death of the foundress. (See CHARITY, SISTERS OF.)—See White's "Life of Eliza A. Seton," for the most part an autobiography (New York, 1853; 5th ed., Baltimore, 1865); and the Right Rev. Robert Seton's "Memoir, Letters, and Journal of Elizabeth Ann Seton" (2 vols., New York, 1869).

SETTER (*canis index*, Caius), a sporting dog of the hound group. The head is remarkably developed, the brain very large, and the ani-



Setter.

mal evinces intelligence, affection, and docility. The figure is intermediate between that of the pointer and spaniel, and it is generally considered as descended from the crossing of these two varieties; it resembles a large breed of the spaniel, and is probably of Spanish origin; the hair is long and silky, less smooth than in the pointer, with much of the waved character seen in the spaniel, even on the ears. The best breeds are those of England and Ireland; the most ancient colors were deep chestnut and white; the English setter is generally white with large spots or blotches of liver color or reddish brown; many are marked with black. The natural instinct to crouch at the sight or scent of game has been cultivated in the setter, but they have been taught also to point with the fore foot raised, so that practically the setter and pointer are used in the same way; they are used only as gun dogs and for birds; their sense of smell is very acute. They take to the water better than the pointer, and are better in close coverts; they will work

well with pointers; in the United States they are taught to bring game; they will almost always point at the scent of turkeys, but not of other domestic fowls.

SETTLEMENT. I. Under the poor laws, the right which one acquires to be considered a resident of a particular place, and to claim relief from such city, town, or village, if he stands in need of it. The conditions determining settlement are almost entirely prescribed by statutes, which provide generally in respect to adults that their residence in any place for a defined term of years gives them a settlement therein. A married woman has the same settlement as her husband, though if he has none within the state it may be provided that her own at the time of the marriage, within the state, is not lost or suspended. Legitimate children have the settlement of the father, or of the mother if the father has none in the state. Illegitimate children take the settlement of the mother. In different states serving under articles of apprenticeship or for wages, and the payment of taxes, are made to give a right to a settlement. **II.** In the limitation or disposition of property, a deed or instrument commonly made previous to or in contemplation of marriage, the object of which is generally to limit property in such modes and to such uses as will assure a provision for the wife and the issue of the marriage. Settlements may be made by the wife, but then they are very often made in consideration of a settlement by the husband; or they may be made mutually by husband and wife upon a separation, during the coverture. The common law troubles itself but little with the equitable right of a woman to retain after her marriage some enjoyment of her own property, but chancery has to a considerable extent interposed in her favor. Whenever the husband was compelled to seek its assistance in order to reach the wife's property, chancery obliged him to make equitable settlements out of it in the wife's behalf. It invented also and supported, for the wife's benefit, the contrivance of a separate use and estate; and it favored those contracts, named settlements, which, employing the equity devices of uses, trusts, and powers, were framed for the purpose of securing by express stipulation this same benefit of a separate estate for the wife. The legislature came in time to reform the law in the same direction, and has enacted, both in England and the United States, those "married woman's statutes" which have materially modified the common law touching the rights of husbands over the estates of their wives.—In general, every person who may alienate his property may make a settlement of it. All persons therefore of full age, and masters of their estates, may settle them as they please. Yet a woman, even if she is of full age, cannot in contemplation of marriage, without the knowledge of her intended husband, make a settlement of her property real or personal; the disappointment of the future

husband's expectations respecting the property of the wife is a fraud on the part of the latter, and invalidates the settlement. Nor, at common law, can a woman under coverture make a settlement without the concurrence of her husband, unless she is acting under a power or is disposing of property which she holds in her separate right. Great inconvenience and disadvantage having arisen from the state of the law in regard to the right of infants to make settlements, a statute was passed in England in 1858 which enabled male infants at the age of 20 and female infants at the age of 17, with the approbation of the court of chancery, to make valid settlements, or contracts for the settlement of all their property, real or personal, whether in possession or in reversion, remainder, or expectancy.—Settlements or agreements for settlements may be made before marriage or after it. Equity will enforce ante-nuptial agreements, provided they are fair and valid, and do not contravene the general policy and principles of the law. A subsequent marriage is consideration enough to support an otherwise voluntary deed. Post-nuptial settlements may be made either voluntarily or in pursuance of articles entered into prior to the marriage. In the latter case, the marriage being of itself a valuable consideration, the settlement is valid both against creditors and purchasers. A voluntary settlement made after marriage, and not resting on any ante-nuptial agreement, is in general void as against creditors existing when the settlement was made; yet it may be good, if made for a consideration which bears a reasonable proportion to the amount tied up by the settlement. The concurrence of a wife in destroying an existing settlement, and her joining in barring her dower, have been held sufficient considerations to support settlements which would otherwise have been held voluntary and invalid.—In framing marriage settlements, it is expedient to vest the property in a trustee, though this is by no means indispensable. The control of the separate estate may be committed to the wife. Regard must be had to the provisions of the statutes which fix the limits to the suspension of the power of alienation, and to the statutes respecting trusts and powers which are enacted as checks upon the disposition to tie up property in certain hands.—The necessity of making settlements is materially lessened by the very general enactment of the so-called married woman's statutes to which we have already referred. It is the chief object of the statutes to give the wife rights, independent of the husband, to take by inheritance, or by gift, grant, or bequest, any real or personal property; to hold it to her sole and separate use; to dispose of it as she pleases during her lifetime, and to demise it as she will at her death.

SETUBAL, *St. Ubes*, or *St. Elbes*, a maritime city of Portugal, in the province of Estremadura, on the N. side of a bay of the same name, 18 m. S. E. of Lisbon; pop. about 15,000. It

stands in a valley, and is defended by a castle and forts. There are several squares and promenades, all superior to any in Lisbon; and the environs are interspersed with numerous picturesque villas and orange groves. Some of the churches are handsome; and among the convents are that of the Capuchin nuns, founded in 1480, and that of Arrabida, on a mountain 1,700 ft. high. The quays are broad, and the harbor is inferior only to that of Lisbon. The well known *St. Ubes* salt of commerce is manufactured here from the neighboring salt marshes of the river Sado, and shipped in immense quantities, principally to Scandinavian ports. Many of the inhabitants are engaged in fishing, and sardines are extensively exported, with oranges and other southern fruits, muscatel wines, and cork. Setubal is a place of great antiquity. It suffered severely from the earthquake of 1755.

SEVASTOPOL. See **SEBASTOPOL.**

SEVEN PINES, *Battle of*. See **CHICKAHOMINY**, vol. iv., p. 411.

SEVENTEEN YEARS' LOCUST. See **HARVEST FLY.**

SEVENTH DAY ADVENTISTS. See **SECOND ADVENTISTS.**

SEVENTH DAY BAPTISTS, a religious denomination known in England as *Sabbatarians*, where they have existed since the early part of the 17th century. In the United States they originated at Newport, R. I., in 1671. In 1818 the general conference rejected the name *Sabbatarians*, and adopted that of *Seventh Day Baptists*. Their views of baptism, communion, and doctrine generally, correspond with those of the Baptists. Their peculiarity is the observance of the seventh day of the week as the sabbath. They are scattered through Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Virginia, Ohio, Wisconsin, Indiana, Illinois, and Iowa, the greater number being in Rhode Island and New York. They have a missionary society supporting a prosperous mission at Shanghai, China; four academies, at Alfred and De Ruyter, N. Y., Shiloh, N. J., and Milton, Wis.; a sabbath tract and publication society, and an educational society which issues a weekly and a monthly periodical. The number of churches in 1874 was 83, and of members 8,237, an increase over the preceding year of 298.

SEVENTH DAY BAPTISTS, German. See **DUNKERS.**

SEVEN WONDERS. See supplement.

SEVEN YEARS' WAR, a contest involving the principal European powers from 1756 to 1763. The empress Maria Theresa, though forced in the treaty of Dresden (1745) to confirm Frederick the Great in the possession of Silesia, did not relinquish the hope of recovering it. She determined to secure a coalition that would crush the king of Prussia, and made active preparations for war. She courted the alliance of Louis XV., and by flattering Mme. de Pompadour gained over the French court. The

friendship between Great Britain and Austria was severed, and the system of European alliances was dissolved. George II., who was already involved in the French and Indian war, perceived that a continental conflict would at once expose his Hanoverian dominions to French invasion, and to protect himself against this danger he concluded a defensive treaty with Frederick the Great on Jan. 16, 1756. Maria Theresa now openly consummated the alliance with France (May 1). Elizabeth of Russia, whom Frederick had provoked by his satire, and Augustus III., king of Poland and elector of Saxony, who was eager to wipe out the disgrace of the previous war, joined the league; the mass of the German states followed; Sweden was gained by the hope of conquests in Pomerania; and a coalition was effected the most powerful that Europe had ever witnessed. The main events of the seven years' struggle in Europe have been described under FREDERICK II. Saxony, Bohemia, Silesia, and Brandenburg were the principal theatres of the war. Here the Prussian king, seconded by his brother Prince Henry, Schwerin, Keith, Seydlitz, the prince of Bevern, Zieten, Dohna, Lewald, and others, was opposed to the Austrian commanders Daun, Laudon, Browne, and Charles of Lorraine, and to the Russian generals Apraxin, Fermor, Soltikoff, and Tchernitcheff. In western Germany, where the incapable duke of Cumberland was defeated at Hastenbeck by the French under D'Estrées (July 26, 1757), and forced by Marshal Richelieu to sign the capitulation of Closter Seven (Klosterseven), the glory of the Prussian arms was sustained by Duke Ferdinand of Brunswick, who frustrated the efforts of Clermont, Contades, Soubise, and Broglie, and by victories like those of Orefeld (June 23, 1758) and Minden (Aug. 1, 1759). Still, Frederick was on the point of being overwhelmed by numbers, when the death of the empress Elizabeth (Jan. 5, 1762) and the accession of Peter III. changed the state of affairs. France, while lavishing her armies in the service of Austria, and her treasures in subsidizing a dozen allies, was compelled to witness the downfall of her colonial power. A French expedition under Marshal Richelieu had succeeded in conquering Minorca from the English, whom the first reverses in America and the fear of a French invasion had plunged into the utmost despondency; but the nation rallied, and under the guidance of the elder Pitt entered upon a remarkable career of success. Louisbourg was taken in 1758, Quebec fell in the following year, all Canada submitted, and Guadeloupe (1759), Martinique (1762), and other West India islands were conquered. Admiral Hawke won a brilliant victory over the French fleet in the bay of Quiberon in November, 1759, and the island of Belleisle, on the coast of France, was taken in June, 1761. Clive humbled the French power in India, and laid the foundations of a mighty empire. On the African coast the

English were equally successful. France, where Choiseul assumed the ministry in 1758, sought to restore her fortunes by a new alliance, and in 1761 concluded the family compact, which united the various branches of the house of Bourbon. A declaration of war between England and Spain followed. While Charles III., the Spanish king, unsuccessfully attacked Portugal, the English reduced Havana, where they obtained immense booty (August, 1762), and made themselves masters of the Philippines. The war was terminated by the treaty of Paris (Feb. 10, 1763) between England, France, and Spain, the preliminaries to which had been signed on Nov. 3, 1762, and by that of Hubertsburg (Feb. 15, 1763) between Prussia and Austria. Great Britain was aggrandized at the expense of the house of Bourbon, while the terms of the peace provided for a mutual restitution of conquests on the continent of Europe. Silesia remained in possession of Frederick. England retained her Canadian and a portion of her West Indian conquests, as well as those on the river Senegal, and acquired Florida from Spain, to whom as a compensation France ceded Louisiana. Martinique, Guadeloupe, and other islands (to which Santa Lucia was added), and Pondicherry were restored to France, and the privilege of the gulf of St. Lawrence and a portion of the Newfoundland coast was secured to French fishermen. In return Louis XV. agreed to dismantle Dunkirk on the sea side.—See Schäfer, *Geschichte des siebenjährigen Kriegs* (2 vols., Berlin, 1867-'8), and Ranke, *Ursprung des siebenjährigen Kriegs* (Leipsic, 1871).

SEVERN, next to the Thames the largest and most important river of England, rising in the S. part of Montgomeryshire, Wales, and falling into the Bristol channel, 10 m. S. W. of Bristol, after a generally N. E., S., and S. W. course of 210 m. Its most important tributaries are the Tern, Teme, Upper Avon, Wye, and Lower Avon. It is navigable 178 m. from its mouth, and the navigation has been extended by locks and canals. Below Gloucester extensive embankments have been raised to prevent inundation. At the mouth the tide rises 48 ft., and at Chepstow on the Wye 60 ft.

SEVERUS, Alexander. See ALEXANDER SEVERUS.

SEVERUS, Lucius Septimius, a Roman emperor, born of a family of equestrian rank near Leptis, Africa, April 11, A. D. 146, died in Eboracum (York), Britain, Feb. 4, 211. He studied law at Rome, became *advocatus fisci*, and afterward held many offices under Marcus Aurelius and Commodus, at Rome and in the provinces, gaining the favor of the people whom he governed, especially in Gallia Lugdunensis, by his integrity and moderation, combined with firmness. When Commodus was assassinated (192) Severus was commander of the army in Pannonia and Illyria; and after the brief reign of Pertinax and the sale of the empire by the prætorian guard to Didius Julianus, he was pro-

claimed emperor by his troops at Carnuntum, and marched upon Rome. No sooner had he appeared before the city (June, 193) than he was acknowledged emperor by the senate, and Julianus was deposed and killed. His first care was to disarm and banish the prætorian guard, and put to death all concerned in the murder of Pertinax. Clodius Albinus, commander of the Roman forces in Britain, and Pescennius Niger, in Syria, had each at the same time with Severus been proclaimed emperor by his army. The former, whom he most feared, Severus associated with himself as Cæsar; and against the latter, having distributed an immense largess to the troops, he marched within 30 days after his arrival at Rome, defeated his legate Æmilianus near Cyzicus, and Pescennius Niger himself near Nicæa, and again on the gulf of Issus, where Niger was slain. Byzantium held out for three years, when it was taken (196), devastated, and dismantled, Rome being thus deprived of its strongest bulwark against the Asiatic barbarians. Meanwhile Severus had crossed the Euphrates and subdued the border tribes. He next attempted to procure the assassination of Clodius Albinus, who, hearing of his intention, passed over into Gaul. Severus marched against him, and the armies, each 150,000 strong, met near Lugdunum (Lyons), Feb. 19, 197; after a terrible slaughter, during which Severus came near losing the battle and his life, Albinus was routed, and died by his own hand. Severus trampled the body under his horse's feet, ordered the head to be cut off and carried to Rome, whither he soon followed, and put to death the family of Albinus, as he had previously that of Niger, besides many senators and others. Soon after, marching against the Parthians, he took and plundered Ctesiphon and other cities, but was less successful against the Arabs. After spending three years more in settling the affairs of Arabia, Syria, and Egypt, he returned to Rome in 202, and gave shows and distributed money with unparalleled profusion, on occasion of his son Caracalla's marriage, and the completion of the 10th year of his reign. The next few years were passed in prosperous administration at Rome, but were disturbed by the discord and profligacy of his sons Caracalla and Geta, both of whom he associated with himself as Augusti. In 208, a war breaking out in Britain, he went thither with them. Caledonia was overrun by his soldiers to the northern extremity of the island; but 50,000 of them were destroyed by the climate and the attacks of concealed foes, and Severus retired southward and began building the wall known by his name. The Caledonians nominally submitted, but again rebelled, and he was preparing for a new campaign when he died.

SEVIER. I. A S. W. county of Arkansas, bordering on the Indian territory and bounded S. by Little river; area, about 825 sq. m.; pop. in 1870, 4,492, of whom 968 were colored. The surface is diversified and the soil mod-

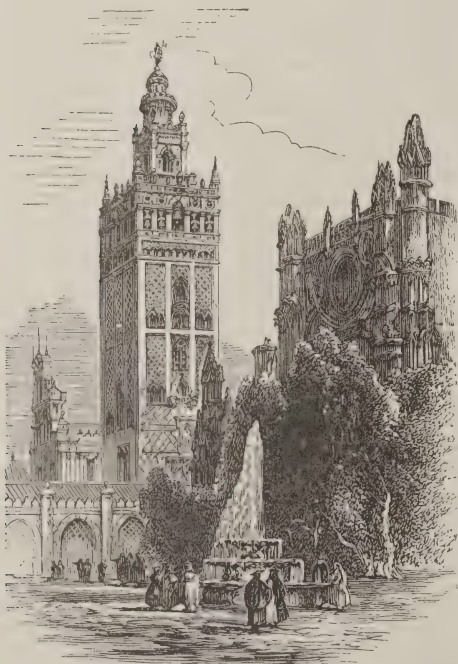
erately fertile. The chief productions in 1870 were 1,919 bushels of wheat, 123,045 of Indian corn, 11,873 of sweet potatoes, 2,189 bales of cotton, 3,367 lbs. of tobacco, and 3,761 of wool. There were 757 horses, 363 mules and asses, 1,472 milch cows, 2,906 other cattle, 2,507 sheep, and 8,658 swine. Capital, Lockesburgh.

II. An E. county of Tennessee, bordering on North Carolina and traversed by French Broad and Little Pigeon rivers; area, 520 sq. m.; pop. in 1870, 11,028, of whom 533 were colored. Much of the surface is mountainous, and the soil along the streams is fertile. Limestone and iron ore abound. The chief productions in 1870 were 63,483 bushels of wheat, 260,214 of Indian corn, 42,460 of oats, 13,997 lbs. of tobacco, 16,109 of wool, 79,135 of butter, 15,528 of honey, and 16,588 gallons of sorghum molasses. There were 1,954 horses, 2,264 milch cows, 3,950 other cattle, 9,578 sheep, and 13,088 swine. Capital, Sevier-ville. **III.** An E. county of Utah, bordering on Colorado, and intersected by the Green and Grand rivers; area, about 7,000 sq. m.; pop. in 1870, 19. The W. part is crossed by the Wahsatch mountains, and watered by Sevier river. Capital, Richfield.

SÉVIGNÉ, Marie de Rabutin-Chantal, marquise de, a French epistolary writer, born in Paris, Feb. 6, 1626, died at Grignan, April 18, 1696. Left an orphan at the age of six, she was brought up by her maternal grandfather, and afterward by her uncle, the abbé de Coulanges, whom she used to style in her letters *Bienbon*. She received lessons and advice from Chapelain and Ménage, who taught her Latin, Spanish, and Italian. As soon as she appeared in society, she was greatly admired on account of her beauty, wit, and wealth. In 1644 she married the marquis Henri de Sévigné, a nobleman of Brittany and a relative of the Retz family, who in 1645 was appointed governor of Fougères. Owing to her husband's family relations, she was involved in the civil troubles of the Fronde, and became acquainted with the duchesses of Longueville and Chevreuse. Her husband was killed in a duel in 1651, and she devoted herself to the education of her son and daughter. Mme. de Sévigné received the homage of many distinguished personages, including the prince of Conti, Marshal Turenne, the count de Bussy (her cousin), and Fouquet. Her letters to her daughter, the marquise de Grignan, which are admired for their vivacity, delicacy, and wit, were not intended for publication, and they were not printed till 30 years after her death (1726). One of the most complete editions is by Regnier, included in *Les grands écrivains de la France* (14 vols., 1862-'6). A selection from the English editions has been edited by Mrs. S. J. Hale (12mo, New York, 1856).—See Walckenaer, *Mémoires touchant la vie et les écrits de Mme. de Sévigné* (5 vols. 12mo, Paris, 1842-'52), and "Madame de Sévigné, her Correspondence and Contemporaries," by Countess de Puliga (2 vols. 8vo, London, 1872).

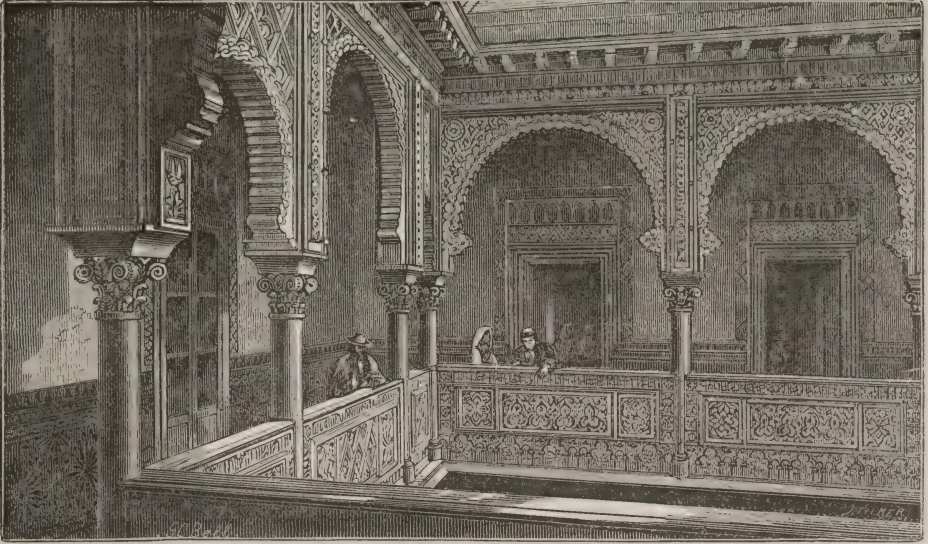
SEVILLE (Sp. *Sevilla*). I. A S. W. province of Spain, in Andalusia, bordering on Badajoz, Cordova, Malaga, Cadiz, and Huelva; area, 5,295 sq. m.; pop. in 1870, 515,011. The northern portion is traversed by the Sierra Morena, and the southern by the Sierra Ronda, with some peaks of considerable elevation; the remainder of the province mainly consists of vast and fertile plains, drained by the Guadalquivir and its tributaries, the largest of which are the Genil, Viar, and Huelva. The climate is extremely hot in summer, but very salubrious. Agriculture is well advanced, and the vine and olive are particularly abundant. There are large numbers of cattle, horses of superior breed, mules, sheep, goats, and swine. Among the mineral products are silver, iron, copper, and lead, with coal, marble, and limestone. Wines and oil of superior quality are produced; and there are manufactories, chiefly at the capital, of silk, woollen, and linen fabrics, soap, leather, brandy, hats, porcelain, common earthenware, leather, &c. The principal town besides the capital is Ecija. II. A city (anc. *Hispalis*), capital of the province and of Andalusia, on the left bank of the Guadalquivir, 62 m. N. N. E. of Cadiz, and 242 m. S. W. of Madrid; pop. (including its seven suburbs) about 115,000. It is situated in a delightful plain, and surrounded by Moorish walls with 66 towers and 14 gates. In 1864 it had 564 streets, mostly

magnificent colonnades and courtyards, paved with porcelain tiles or marble and embellished with fountains. The cathedral, one of the largest and finest in Spain, exquisitely decorated within and without, was completed in 1519, on the site successively occupied by the temples of Astarte and Salambo, and the ancient mosque of Seville. Although repeatedly despoiled, it still contains some of its finest pictures by Murillo and other masters. The main tower, the Giralda, erected in 1196 as the chief muezzin tower of the ancient mosque, was at first but 250 ft. high; but in 1568 was added a superb filigree belfry surmounted by a bronze figure of "Faith," and the present height is about 350 ft. The cathedral has one of the largest organs in the world, and contains the tombs of St. Ferdinand, who conquered the city from the Moors, Queen Beatrice his first wife, Alfonso the Wise, and other celebrities. Attached to the *sagrario* or parish church, contiguous to the cathedral, is a library of about 18,000 volumes, the gift of Fernando Columbus, the son of Christopher, and containing several manuscripts by him and his father. The city has a large number of other parish churches, chapels, convents, and nunneries. The benevolent institutions are also numerous. Among the other edifices of note are the *alcázar* or Moorish castle, in many respects equal to the Alhambra of Granada; the archiepiscopal palace; the *casa de Pilato*, so called from a reputed resemblance to Pontius Pilate's house at Jerusalem, and now the palace of the duke of Medina-Celi; the city hall and other government buildings; the court house, mint, exchange, custom house, and tobacco factory. The *torre de oro* or tower of gold, long the storehouse for the treasures from America, is said to have been built by the Romans. The bull ring, commenced in 1760, but still unfinished, accommodates 11,000 spectators. The university, founded in the beginning of the 16th century, has a good collection of pictures and sculptures, museums of chemistry, physics, mineralogy, and zoölogy, and a botanical garden. Seville has also a school of fine arts, colleges of law, medicine, and commerce, a nautical academy, and a large number of other schools, many of which are for females alone. In the grand tobacco factory are employed 3,000 women, chiefly from the Canaries, and 600 men; and brass cannon, small firearms, saltpetre, and gunpowder are made in the ordnance foundry. Seville formerly carried on a large portion of the trade with the new world. This business was in the early part of the 18th century transferred to Cadiz in consequence of the silting up of the Guadalquivir, which rendered it unnavigable by vessels of over 100 tons. The staple articles of export are oil, oranges, wine, silk, leather, quicksilver, copper, and lead.—Seville was called Sephela by the Phœnicians, *Hispalis* by the Romans, and *Ishbiliyah* by the Moors. It was captured in 45 B. C. by Julius Cæsar, who made it a Ro-



The Giralda.

narrow and tortuous, but well lighted, and 62 public squares. Many of the houses are remarkable for architectural beauty, and have



Interior of the Alcázar of Seville.

man colony, patronizing it in opposition to Cordova, which had espoused the cause of Pompey. When the Goths invaded the country they made it their seat of power, but in the 6th century the court was removed to Toledo. It was in the hands of the Moors from 711 till 1248, and under them attained great splendor, and a population of 300,000. In 1248 Ferdinand III. of Castile and Leon took it after a long siege, and made it the capital of those united kingdoms, which it remained until the reign of Charles V. A treaty was concluded at Seville in 1729 between Spain, France, and England. The city surrendered to the French under Soult in 1810, when the inhabitants were cruelly treated, the plunder and money extorted from them being estimated at \$30,000,000. They evacuated it in August, 1812, when the English entered the town. It was besieged by Espartero in July, 1843.

SÈVRES, a town of France, in the department of Seine-et-Oise, on the left bank of the Seine, 6 m. S. W. of Paris; pop. in 1872, 7,096. It stands in a valley between the hills of Meudon and St. Cloud, and the main street is of great length, being traversed by the Versailles road. The celebrated porcelain factory was removed hither in 1756 from Vincennes, and in 1760 became the sole property of Louis XV. (See *POTTERY AND PORCELAIN*, vol. xiii., p. 785.) Connected with it is a museum, and in 1875 a school of mosaics was established. There are also manufactories of shawls, cordage, leather, and chemical substances, and various chemical arts are carried on.—Sèvres was occupied by the Germans Sept. 19, 1870, bombarded by the French Oct. 5, and attacked by the troops of the commune April 4, 1871.

SÈVRES, Deux, a W. department of France, in the old provinces of Poitou and Angoumois, bordering on Maine-et-Loire, Vienne, Charente, Charente-Inférieure, and Vendée; area, 2,317 sq. m.; pop. in 1872, 331,243. A chain of hills which have a mean height of 450 ft. traverses the department S. E. and N. W., dividing it into two distinct portions. The Sèvre-Nantaise and Sèvre-Niortaise, which rise in the department and give it its name, flow respectively N. W. to the Loire at Nantes and W. to the Atlantic, passing Niort. The Thouet and several other small rivers also have their sources here. The department is traversed by seven canals. Iron, rock crystals, and saltpetre are found. The vineyards in the S. W. part produce good brandy and white wines. There are manufactories of woollen, linen, and cotton goods, leather, earthenware, brandy, cutlery, and paper. It is divided into the arrondissements of Bressuire, Melle, Niort, and Parthenay. Capital, Niort.

SEWARD. **I.** A S. E. county of Nebraska, intersected by the Big Blue river and its forks; area, 576 sq. m.; pop. in 1875, 6,601. The surface is undulating and the soil productive. It is traversed by the Midland Pacific railroad. The chief productions in 1870 were 58,579 bushels of wheat, 58,637 of Indian corn, 31,620 of oats, 18,488 of potatoes, 35,601 lbs. of butter, and 5,205 tons of hay. There were 1,214 horses, 718 milch cows, 1,161 other cattle, 509 sheep, 1,296 swine, and 3 saw mills. Capital, Seward. **II.** An unorganized S. W. county of Kansas, bordering on Indian territory; area, 720 sq. m. It is watered by affluents of the Cimarron river. The surface consists of rolling prairies.

SEWARD, Anna, an English authoress, born at Eyam, Derbyshire, in 1747, died in Lichfield, March 25, 1809. At nine years of age she could repeat the first three books of "Paradise Lost." At Lichfield, where the greater part of her life was passed, she became intimate with Dr. Erasmus Darwin, of whom in 1804 she published a memoir, in which she lays claim to the first 50 lines of his "Botanical Garden." Her poetical works consist of "Louisa," a metrical novel (1782), and "Sonnets" (1799). Her elegies on Captain Cook and Major André had great celebrity. She was called by her contemporaries of the Della Cruscan school "the swan of Lichfield." She bequeathed a mass of manuscript poetry and correspondence to Sir Walter Scott, which he edited in 1810. Constable also published six volumes of her correspondence (1811).

SEWARD, William Henry, an American statesman, born in Florida, Orange co., N. Y., May 16, 1801, died in Auburn, N. Y., Oct. 10, 1872. He graduated at Union college in 1820, having passed six months of his senior year in teaching in Georgia, and was admitted to the bar in 1822. He commenced practice in Auburn, where in 1824 he entered upon political life by preparing an address for a republican convention, announcing an opposition to the "Albany regency," as the leaders of the democratic party of New York were then styled, which was continued until crowned with success in 1838. In August, 1828, he presided over a young men's convention in New York, called to favor the reelection of John Quincy Adams to the presidency, and on his return home was tendered a nomination as member of congress, which he declined. In 1830 he was elected to the state senate as an anti-mason by a majority of 2,000, although the district had given a large adverse majority the preceding year. He originated an opposition to corporate monopolies which has since ripened into a system of general laws. In 1833 he made a rapid tour of Great Britain and a portion of the continent, and contributed a series of letters to the Albany "Evening Journal." In 1834 he was the whig candidate for governor, and was defeated by W. L. Marcy; but in 1838 he was elected governor by a majority of 10,000 over Gov. Marcy. Among the measures to which he directed his attention were the extension of public education, the prosecution of the public works, including the enlargement of the Erie canal, and the removal of the legal disabilities imposed on foreigners. A prominent feature of his administration was his effort to secure the diffusion of common school education among children of every class, especially those in large cities and of foreign parentage, advocating an equal distribution of the public funds among all schools established with that object. Amid much opposition he exerted all his influence in favor of a reform in the courts of law and of chancery, preparing the way for the radical changes effected in the constitution of

1846. The geological survey of the state, the perfection of the general banking system, and the establishment of a lunatic asylum were also measures of his administration. Imprisonment for debt was entirely abolished, the anti-rent rebellion was subdued, and every vestige of slavery was cleared from the statute books. In a controversy between Gov. Seward and the executive of Virginia on the application of the latter for the return of two seamen charged with abducting slaves, Seward maintained that no state could force a requisition upon another state founded on an act which was only criminal by its own legislation, and which, compared with general standards, was not only innocent, but humane and praiseworthy. The correspondence, known as "the Virginian controversy," was widely published. Mr. Seward was reelected in 1840. On retiring from office (Jan. 1, 1843) he resumed the practice of law, first in the state courts, and afterward acquiring a lucrative share of patent causes in the courts of the United States. He occasionally appeared in criminal cases where persons were, as he thought, unjustly accused, when he not only gave his best efforts gratuitously, but sometimes furnished large sums for a proper defence. His arguments in the cases of Van Zandt, charged with harboring fugitive slaves in Ohio, of Freeman, charged with murder, and of 50 citizens of Michigan indicted for conspiracy, hold a high rank in the records of criminal trials. In 1844 Mr. Seward entered with energy into the presidential contest in behalf of Henry Clay, and again in 1848 in support of Gen. Taylor. In February, 1849, he was elected United States senator. On the meeting of congress in December following, the members from the south, apprehending the adoption of an anti-slavery policy, took ground in opposition to Gen. Taylor's administration, and Mr. Seward soon became the leader of the administration party. In his subsequent speeches he avowed a determination to make no further concessions to the slave power, and was denounced as a seditious and dangerous agitator. In a speech on the admission of California into the Union, March 11, 1850, he used the following language: "It is true, indeed, that the national domain is ours. It is true, it was acquired by the valor and with the wealth of the whole nation. But we hold, nevertheless, no arbitrary power over it. We hold no arbitrary authority over anything, whether acquired lawfully or seized by usurpation. The constitution regulates our stewardship; the constitution devotes the domain to union, to justice, to defence, to welfare, and to liberty. But there is a higher law than the constitution, which regulates our authority over the domain, and devotes it to the same noble purposes. The territory is a part, no inconsiderable part, of the common heritage of mankind, bestowed upon them by the Creator of the universe. We are his stewards, and must

so discharge our trust as to secure in the highest attainable degree their happiness." The phrase "higher law," thus applied to the law of God, was the subject of much excited comment in the senate and in the public press, and was afterward urged as a ground of reproach by the political enemies of Mr. Seward. The death of President Taylor in July, 1850, and the accession of Vice President Fillmore, brought the conservative wing of the whig party into prominence; but Mr. Seward still maintained his position as a leader on the anti-slavery side. Besides his speeches on the compromises of 1850, he delivered several others on the commercial and industrial relations of the country. His speeches on the repeal of the Missouri compromise and the admission of Kansas, like those on the compromises of 1850, were widely circulated. In 1858 he made a speech at Rochester, in which, after alluding to the constant collision between the systems of free and slave labor in the United States, he said: "It is an irrepressible conflict between opposing and enduring forces, and it means that the United States must and will, sooner or later, become either entirely a slaveholding nation, or entirely a free labor nation." The southern secession threatening during the last session of the 36th congress (1860-'61), Mr. Seward in the senate expressed his views on "the state of the Union" in two speeches, in which he said: "I avow my adherence to the Union with my friends, with my party, with my state, or without either, as they may determine; in every event of peace or war, with every consequence of honor or dishonor, of life or death." He declared also in conclusion: "I certainly shall never directly or indirectly give my vote to establish or sanction slavery in the common territories of the United States, or anywhere else in the world." Mr. Seward's second term closed with the 36th congress, March 4, 1861. He had been reelected in 1855 under circumstances of peculiar interest. He was strenuously opposed both by those who disliked his uncompromising resistance to the slave interest, and by those who could not tolerate his opposition to the "American" party, at that time a rising power throughout the Union. The whig party having adopted in 1852 a platform approving of the slavery compromises of 1850, and nominated Gen. Scott for the presidency, Mr. Seward declined to sustain the platform, while he yielded his support to the candidate. In the presidential canvass of 1856 he was very active in behalf of Col. Fremont, the republican candidate. In 1859 he made a second visit to Europe, and extended his travels to Egypt and the Holy Land. In 1860, as in 1856, a large portion of the republican party favored his nomination for the presidency. In the convention, on the first ballot, he received 173½ votes, Mr. Lincoln, the next highest, 102—necessary for a choice, 233. Lincoln having been nominated, Seward

actively canvassed the western states in his behalf. Lincoln tendered the chief place in his cabinet to Mr. Seward, and on March 4, 1861, he entered upon the duties of secretary of state. Secession was then imminent, but Seward apparently failed at first to apprehend the magnitude of the movement. He declined (March, 1861) to negotiate with confederate commissioners, but believed that the difficulties of the two sections could be settled without recourse to arms; and he favored as a peace measure the evacuation of Forts Pickens and Sumter. During the entire war his management of foreign affairs was eminently politic and effective. Conspicuous among these efforts were his conduct in the Trent affair (November, 1861); his declining the proposal of France to unite with Russia and Great Britain to mediate between the federal government and the confederates; his course in respect to the French invasion of Mexico; and his thorough reorganization of the diplomatic service abroad, so that by the American representatives, as well as by his own despatches, the real issues at stake in the civil war were constantly made prominent to foreign governments. His diplomatic management during this critical period more than once kept the country from involvement in a foreign war. On Lincoln's election to a second term Seward continued as secretary of state. Early in the spring of 1865 he was thrown from his carriage, and his jaw and one arm were broken. While he was confined to his bed by these injuries, on the night of the assassination of Lincoln, April 14, one of the conspirators penetrated to Seward's room and struck him several times with a knife, and also severely wounded Frederick W. Seward, who came to his father's rescue. The assassin escaped from the house, but was soon arrested, and was hanged with other conspirators, July 7. Mr. Seward's recovery was slow and painful; but as soon as he was able he resumed the duties of his office under President Johnson, becoming unpopular with a large portion of his party from his support of the president's reconstruction policy. In March, 1869, he retired from public life, and soon after made an extended tour through California and Oregon, and went to Alaska, which had been acquired during his secretaryship and mainly through his efforts. In August, 1870, accompanied by members of his family, he set out upon a tour around the world, returning to Auburn in October, 1871. He was everywhere received with the greatest distinction, and the results of his observations were embodied in "William H. Seward's Travels around the World," edited by his adopted daughter, Olive Risley Seward (8vo, New York, 1873).—Mr. Seward contributed a historical essay, entitled "Notes on New York," to the great work on the natural history of the state, to which it forms the introduction. In the senate he delivered eulogiums on Clay, Webster, Clayton, Rusk, and Broderick. In 1849 he prepared a life of John

Quincy Adams in a popular form, which had an immense sale. He also wrote a biography of De Witt Clinton, an abstract of which he prepared for this Cyclopædia. "The Works of William H. Seward" (4 vols. 8vo, New York, 1853-'62) include a biographical memoir and historical notes, edited by George E. Baker. Most of his public orations have been printed separately; the latest is "Speech at Sitka, Aug. 12, 1869." See also "Review of Mr. Seward's Correspondence of 1862," by William B. Reed (Philadelphia, 1862); "The Life, Character, and Services of William H. Seward," a memorial address before the New York legislature, April 18, 1873, by Charles Francis Adams (New York, 1873); and "Lincoln and Seward," remarks on Mr. Adams's address, by Gideon Welles (New York, 1874).

SEWELL. I. William, an English clergyman, born in the isle of Wight about 1805, died at Leachford hall, near Manchester, Nov. 14, 1874. He was the son of a solicitor, was educated at Harrow and Oxford, and became fellow of Exeter college and incumbent of Carisbrook castle chapel, isle of Wight. He was public examiner in the university from 1836 to 1841, and in 1852 was appointed principal of St. Peter's college at Radley. He was a supporter of the tractarian movement. He published "Hora Philologica" and "Conjectures on the Structure of the Greek Language" (1830); "Sacred Thoughts in Verse" (1831; 2d ed., 1842); "Parochial Sermons" (1832); "Christian Morals" (1840; new ed., 1849); "Introduction to the Dialogues of Plato" (1841); "Christian Politics" (1844); "The Agamemnon of Æschylus," translated (1846); literal and rhythmical translations of "The Georgics of Virgil" (1846) and "The Odes and Epodes of Horace" (1850); and "Christian Vestiges of Creation" (1861).

II. Elizabeth Missing, an English authoress, sister of the preceding, born in the isle of Wight in 1815. Her first publication was "Amy Herbert" (1844), a high church religious novel. Among her later works are: "Gertrude" (1847); "Experience of Life" and "Journal of a Summer Tour on the Continent" (1852); "Katherine Ashton" (1854); "Ivors" (1856); "Ursula, a Tale of Country Life," "Clove Hall," "Earl's Daughter," and "Margaret Percival" (1858); "History of the Early Church" (1859); "Impressions of Rome, Florence, and Turin" (1862); "Isabel Grey" and "The Poor Brother" (1863); "Homely Ballads and Stories in Verse" (1865); "Rose of Cheriton, a Ballad" (1866); and several religious works and histories of Greece and Rome for the young.

SEWELLEL, a North American rodent of the genus *aplodontia* (Rich.), so called from the simple structure of the molars, apparently connecting the beaver with the squirrels through the spermophiles. It resembles the prairie dogs in the hairy and obtuse nose, fore feet with five claws, distinct ears, very short tail, and the flattened outline of the skull; but the

rootless molars and the absence of post-orbital process bring it near the beaver. The fore claws are much larger than the hind ones,



Sewellel (*Aplodontia leporina*).

even the short thumb having one; the soles and heels naked; the mouth is rather small, the lips thick, and cheek pouches absent; the incisors are strong, flat, without grooves, and yellow, and the molars $\frac{1}{2}$ - $\frac{5}{8}$, prismatic, the anterior very small; the bony orbits very large, and the cranial cavity small; the descending branch of the lower jaw is twisted so as to be horizontal behind, and its lower angles are extended inward as far as the molars, the whole jaw being very strong. The only described species of the genus is the *A. leporina* (Rich.), about the size of a muskrat, with a short, thick, and heavy body; the color is reddish brown, grayish plumbeous below; the eyes are very small, the whiskers long and stiff, the ears rounded and covered with hair, and the tail much flattened; the fur is dense and soft, with longer bristly dark hairs interspersed; the limbs are short and robust; mammae six, the interior two between the fore legs; the length is 16 in., of which the head is $3\frac{1}{2}$ in. and the tail $1\frac{1}{2}$ in. It is found on the N. W. coast, in Washington territory, in Oregon, and in California, in timber lands near the coast. They form small societies, living in burrows, and feeding on vegetables; the natives make robes of the skins.

SEWERAGE, a system of drainage under the streets of towns for carrying off the surface waters and the liquid refuse matters from houses. The necessity of underground channels of this character to the comfort and health of thickly populated places was well understood by the ancient Romans, who at a very early period adopted a regular system of drainage in their famous sewers. (See *CLOACÆ*.) These included not merely the spacious subterranean vaults by which the drainage of the pestilential marshes about the city was effected, but also the wooden pipes, clay tubes, or drains of whatever kind by which the impurities were conveyed from the houses into the main conduits. An elaborate system of sewerage has recently been discovered in con-

nection with the Colosseum. So completely was the city underlaid by these passages, that it was designated by Pliny as *urbs pensilis*, a city supported upon arches. The *avaskara mandira* (filth temple) of the ancient Hindoos was beyond doubt connected with channels and receptacles for its accumulations. The great canal system of Egypt, executed under Rameses I. and his successors, served extensive sewerage purposes; and probably also the magnificent canals of Assyria and Babylon, fed by the Tigris and Euphrates. The ancient Chaldean tomb mounds possess great interest on account of their system of drainage. Long shafts of baked clay extend from the surface of the mound to its base, composed of a succession of rings 2 ft. in diameter and about 1½ ft. wide, joined together by thin layers of bitumen. (See Rawlinson's "Five Ancient Monarchies," vol. i., p. 89.) The recent discoveries of Dr. Pierotti among the ruins of Jerusalem have shown that the ancient city contained a complex and perfect system of aqueducts, drains, and reservoirs. The preservation of many of the aqueducts is owing to the fact that they were excavated in the solid rock, and have not been affected by the demolition of the structures above. It appears that the pool of Siloam received the washings of the temple, and the liquid was used for the purpose of irrigating the king's gardens. The discoveries clearly show that the inhabitants of Jerusalem were fully aware of the necessity of speedily removing all decomposable refuse matter.—The system of sewerage of Paris has during the last half century been made among the finest in the world. Previous to the 14th century, Paris being walled only on the south, the drainage of the faubourgs St. Germain and St. Marceau was poured into the Bièvre; but when this district was surrounded by ditches about 1356, in the reign of King John, the sewers of the quarter St. Germain-des-Prés were turned into these ditches, and they have since taken the same course, being carried by the vaulted sewer which starts from near the *école de médecine*, and empties into the Seine below the *palais des arts*. On the opposite bank an open sewer was covered over in the reign of Charles VI. by Hugues Aubriot, and hence he is said to have commenced the system of covered sewers in Paris. The open sewer of St. Catharine was very offensive to the inhabitants of the *palais des tournelles*, and as a consequence Francis I. bought the site of the Tuileries. As late as 1663, in the reign of Louis XII., there were only 1,207 toises of covered sewers in Paris, and 4,120 toises of open sewers or ditches. The sewer formed by the ancient rivulet of Ménilmontant, then and now called the *grand égout de ceinture*, was not walled and covered till 1740. In 1805 Napoleon authorized necessary repairs and the extension of the covered sewers of Paris. In 1806 there were about 23,000 metres of covered sewers, but in 1862 they amounted to

about 226,000; at present (1875) the total length of covered sewers is about 400,000 metres, or nearly 250 m. To organize the great system of sewerage, Paris was divided into five basins, of which three are on the right and two on the left bank of the Seine. Six principal galleries cut the city at right angles, and receive 15 secondary galleries, and these in turn numerous minor galleries. Besides these galleries, the old grand sewer, the *égout de ceinture*, serves as a collector, into which the others empty. This grand sewer now starts from the rue des Coutres-Saint-Gervais, follows the rues Vieille-du-Temple and Filles-du-Calvaire, crosses the boulevards, follows the rue des Fossés-du-Temple, traverses the lower end of the boulevard Prince Eugène, continues its course through the rues du Château-d'Eau, des Petites-Écuries, Richer, de Provence, and de Saint Nicolas-d'Antin, and falls into the general collector at Asnières, under the boulevard Malesherbes. Formerly it emptied into the Seine at Chaillot. The principal galleries on the left bank are: 1, that along the line of quays; 2, that which follows the boulevard Saint-Michel; and 3, the vast subterranean canal which receives the Bièvre. These sewers also fall into the general collector at Asnières, under the place de la Concorde, crossing the Seine by means of a reversed iron siphon over a yard in diameter and 217 yards long, entering the river about 6 ft. below low-water mark. In many of the galleries there are railways, on which cars are run in cleaning the sewers, and also for carrying visitors. The water and gas mains are also carried in the galleries covering the principal sewers.—In England sewer commissioners were appointed in the reign of Henry VI., but their powers were restricted to surface drainage and sea walls, the subject of municipal sewerage being left principally to local commissions, and in some of the cities to corporations empowered by special acts of parliament. The drainage of London was provided for by legislative enactments commencing in 1225, and the whole subject was thoroughly revised by Sir Thomas More in the celebrated "bill of sewers," passed in 1531. The use of the sewers of London, even up to the present century, was limited to the removal of the waters that ran in the gutters of the streets, including those thrown out from the houses; and in the reign of George III. an act was passed prohibiting the discharge of other matters into them under penalty of a fine. Every house was provided with a cesspool, and this was occasionally discharged by the night carts which conveyed away the offensive matters. Upon the gravelly soil to which the city was then limited this answered very well; but its extension over the more impervious clay beds, and the introduction of abundant supplies of water into every house, followed by the invention of water closets, led to a new use of the sewers, and to various results not at all contemplated in their original

construction. The refuse matters of the cess-pools, instead of being transported into the country to serve as manure, were turned into the river Thames, polluting its waters, while the sewers themselves in the lower parts of the city were incompetent to discharge the increased burdens, and the ventilating flues through the streets became avenues of the most poisonous gases. A reconstruction of many of the sewers upon a larger scale became necessary, and they were laid out upon a regular system, coming down to the river from each side for a distance of 6 m. along its course. Their total length exceeded 2,000 m., and when they were completed London was regarded in 1855 as one of the best drained cities in the world. The principal sewers were of extraordinary dimensions, several being from 12 to 14 ft. high and 6½ ft. wide. Notwithstanding the great scale of this drainage system, the most serious difficulties were experienced in its operation. The outlets of the sewers, in order to get sufficient fall for discharge, were placed but little above low-water mark, the surface of some portions of the city itself being below high-water mark. Consequently the sewers were closed by the tide except at low water, and the gaseous contents of the sewage turned back into the city and up the drains into every street and house. The discharge moreover taking place only about the time of lowest water, the accumulated contents of the sewers were kept up the river until the ebb, and when at last carried down the stream they were replaced by the same amount of fresh filth. Foul banks of black mud, from which most offensive odors emanated when laid bare at low tide, collected along the banks and in the shallow parts of the river. In 1858 it was decided to adopt some active measures for the abatement of the nuisance. It was attempted to disinfect the sewage by discharging every day during the warm weather immense quantities of lime and chloride of lime into the river. The quantities of these thus thrown in in the summer of 1859 amounted to 110 tons of lime and 12 tons of the chloride every day, at a weekly cost of about £1,500; and in that season £20,000 more were also expended in flushing the sewers in order to aid in expelling their contents at extreme low water. Plans were also sought for from scientific and practical men by which the serious difficulties encountered might be permanently overcome; and at last one submitted by Mr. Bazalgette, chief engineer of the board of works, was adopted and executed. The main feature of this plan consists in a series of three grand parallel main sewers at different levels and distances from the river, and on each side of it, which cross the old sewers and outfalls at right angles and intercept the contents of the old system, conveying them on the north of the Thames down the river to Barking, a distance of 7 m., and on the south side to Crossness in the Erith marshes, 7½ m. At this point

the sewage is received in enormous reservoirs, which principally discharge at favorable conditions of tide into the Thames; but a portion is used in making what is called "native guano" by the "A, B, C" process. The work of constructing these great intercepts, pumping stations, &c., was immense; the intercepting sewers alone, 82 m. in length, cost £4,250,000, which was raised by a third rate levied on the metropolis, yielding £180,262 per annum, principal and interest to be paid off in 40 years. It is estimated that the total cost of these great works will not be far from £30,000,000. Notwithstanding the great improvements that have been effected in England, serious defects still exist affecting the water supply of London, from sewage outfalls above the city, but which were being remedied in 1875.—In America, sewer construction has both an ancient and a modern history. The works of the mound builders prove them to have been expert in the building of reservoirs, aqueducts, and conduits; and various places between the north-west and Central America exhibit remains of their sewer constructions. The modern history of sewers in America is not marked by any special achievements, the sewer systems of her principal cities being the result of rapidly increasing necessity. As a rule, therefore, the sewers of the cities have been built piecemeal and rarely on a far-sighted plan, and generally discharge into the nearest available body of water.—The construction of sewers depends, as to material, size, shape, &c., upon the uses they are to serve, and the conditions under which they must be built, embracing the consideration of area to be sewered, its geological and topographical characters, the amount of rainfall, the water supply, the present and prospective population, and the disposal of the sewage. The difficulties encountered are in part the character of the earth, this being often so soft as to demand artificial supports for the pipes and sides of trench, or so hard as to require expensive excavation, the difficulty of securing sufficient fall, and that of providing for varying degrees of foulness in street wash, and securing safe escape for sewer gases. For cleaning purposes large man-holes are now depended upon, together with facilities for flushing. The form depends upon the amount of surface water, of manufacturing waste and excrement, and of subsoil water. If the sewage contains little solid matter, a flat or obtuse oval bottom will answer; but it is found that less fluid matters will be more efficiently discharged by an egg-shaped oval, which secures a greater depth and velocity of flow. An important change has of late years been made by the substitution, where the drainage is comparatively small, of small earthenware pipes for large brick and stone sewers, whereby leakage and earth contamination have been reduced. A difficulty attending their use is the removing of sections for repairs. The *cloaca maxima* of Rome and the great sewers

of Paris are built of cut stone, as were some of the conduits of the mound builders. The great main drainage works of London are cylindrical sewers of brick. The system of Capt. Liernur, now so highly lauded and being adopted in Europe generally, has its pipes all of riveted wrought or cast iron. Sewers are generally laid along the middle of the street and at depths according to the grades. At many street corners "catch pools" are built of brickwork, which, covered by open gratings, receive the wash of the street, retaining in the bottom the mud and sand and discharging the water into the sewer. In towns having districts whose surface is scarcely above high tide, the principle of interception requires attention from the engineer. Intercepting sewers receive the surface water, and often also the sewage, and divert it from the common sewer which passes to the lower districts. In towns where the sewage is pumped from the lower districts to higher levels on account of tide-locked sewers, the system of interception becomes of great importance and greatly reduces the cost of drainage. This is well understood in the great drainage works in the fen districts of England, where large areas are entirely surrounded by intercepting drains, which lead the water off by gravitation. The great intercepting sewers of London, which have been mentioned, have been constructed to convey rainfall at the rate of a quarter of an inch in depth over the whole area drained every 24 hours, at the time the maximum flow of sewage is being discharged. When the flow in a sewer does not carry off the solid contents, it is convenient to clean it by washing it out, or "flushing" as it is technically termed. The operation is performed by letting in water at the higher levels, or by retaining the sewage in sections by means of gates, and, when the portion below has become partly empty and that above nearly full, allowing the collection by its gravity to sweep away accumulations below. The grounds occupied by the annual fair at Nizhni Novgorod, Russia, have sewers built of cut stone arranged in regular streets. They are lofty and well ventilated, and are entered by stairways through towers placed at intervals. They are flushed every day with water pumped from the Volga.—The ventilation of sewers is a subject of great importance in a sanitary point of view. The effluvium from the ventilating holes in pavements has been found to taint meat in butchers' stalls in their vicinity, to avoid which connections have been made with the chimneys of manufacturing establishments. It is not improbable that the solution of the problem will be in the erection of special chimney stacks. The relative efficiency of deodorizers has received attention. In 1858 the commissioners of London sewers reported that wood charcoal has a power of deodorizing currents of foul gases which is not much diminished by long use. The comparative cost of disinfectants to purify a given amount of sewer

age in a uniform condition, made previous to the report, is shown in the following table:

Boghead charcoal (coke), 1 ton.....	\$3 00
Nitric acid.....	8 50
Black oxide of manganese.....	9 25
Chloride of lime.....	10 75
Peat charcoal.....	11 00
Animal charcoal.....	16 75
Bichloride of mercury.....	18 00
Impure chloride of zinc in damp powders.....	26 00
Chloride of zinc in solution (Sir William Burnett's).....	37 00
Sulphate of copper.....	39 00

Other sulphates, as well as a number of other substances sometimes employed as disinfectants, proved ineffectual even in very large quantities to produce complete deodorization; but arsenious acid, creosote, and carbolic acid were found to possess great deodorizing power. Baldwin Latham has devised a combination of man-hole, street-water, and dirt catch with overflow pipe, and a charcoal ventilator protected from wet, which has been put in use in London with fair results. The gases principally found in sewers are carbonic acid, sulphuretted and carburetted hydrogen, ammonia, nitrogen, and fetid organic vapor; but it is only in the most unfavorable localities that the permanent gases are in sufficient quantity to produce of themselves bad effects. It is the poisonous germs contained in the accompanying organic vapor, and which may not have any very offensive or at least powerful smell, that confer on "sewer gas" its most deleterious properties. To prevent the entrance of sewer gas into houses is a problem which presents many practical difficulties. Various forms, of traps are placed at the discharge of the house pipe into the sewer, and also in the water closets and beneath the wash bowls. In the discharge into the sewer the pipe usually dips beneath the surface of the water in a receptacle which empties into the sewer. In water closets a "sealing pan," as it is called, holds water in its cavity when its rim is horizontal, the level of which is above the lower rim of the hopper. The joints of the hopper at the upper rim being made tight, no gas can escape into the room. The waste pipe below the hopper has a syphon crook, which when filled with water prevents the escape of gas from the pipe below. Other kinds of closets, which involve some additional expense, are preferred. A pump closet, used upon ships and below the water line, is modified for house purposes, and made to exhaust the hopper and force the contents out of the soil pipe.—*Disposal of Sewage.* This is one of the vexed and unsettled problems of the day, both in an economical and a sanitary point of view, and embraces the question of utilization of sewage, which also includes many plans, none of which have been confirmed as satisfactory. It is the opinion of many that when a town is so situated that its sewage may be safely run off into a harbor or a river, so as not to become a nuisance afterward, this is the best method to pursue, as by a proper system of sewers

with house connections it offers less danger than any other system of producing infection. When such disposal is impossible without raising the sewage from reservoirs by pumps and discharging it into a river which at the same time has a tide that will carry much of the sewage back to the town, as is the case at London, the question of utilization presents itself. There are five principal systems of utilization: 1, irrigation; 2, filtration; 3, precipitation; 4, dry earth; 5, the pneumatic system. Irrigation has been the most largely practised, but it is contended by its opponents that deleterious organic compounds are taken up by the growing plants as well as scattered through the air in the process, and by exhalation from the soil. Its advocates insist not only that a large yield is secured, but that the crop is grown in as healthful a condition as by ordinary culture. It consists in distributing the sewage over the surface of the soil, from reservoirs into which the sewers empty or into which their contents are pumped. The objections are that infection is not sufficiently prevented, as before stated, and that, on account of topographical and geological conditions of the surrounding country, it is often impracticable. The advocates of filtration contend that it is economical and innocuous. Intermittent downward filtration is described as a variety of irrigation combined with deep drainage, so that the soil may be made to alternately receive the sewage and the air by which it is decomposed, freed of its poisonous qualities, and made fit to give nourishment to plants. Weare's process of filtration consists in filtering the sewage through charcoal, ashes, and soil contained in boxes, and is said to answer very well on a small scale. Precipitation is performed by several methods. The lime process of Gen. Scott, architect of the Albert hall, London, consists in mixing the sewage with a small proportion of milk of lime, agitating the mixture, and allowing it to subside. The precipitate is a very putrescible mud, and the liquid flows off in a tolerably clear condition, and has been used in the manufacture of a hydraulic mortar. But the precipitate contains only a small portion of valuable manurial constituents, and the drying of it is a very offensive operation. The superphosphate of lime (or Blythe's) process attempts to recover the ammonia from the sewage. Superphosphate of lime and a salt of magnesia are added under the supposition that an insoluble phosphate of magnesia and ammonia will be thrown down, but analyses show that a part of the phosphoric acid runs off in the solution. It was rejected by the English sewage commission. Holden's process mixes the sewage with sulphate of iron, lime, and coal dust. The "A, B, C" process, as it is called, or the process with albumen, blood, clay, and charcoal, has been worked by the "Native Guano Company," and is said to be successful. It consists in coagulating blood obtained from slaugh-

ter houses, together with whatever coagulable matters may be in the sewage, with sulphate of alumina, producing a flocculent precipitate which shall drag down by the aid of the heavy particles of clay the organic solids contained in the sewage; and the charcoal is for the purpose of absorbing gases. A company is working at Crossness, between Plumstead and the Erith marshes, at the southern outfall of the London drainage, which is there discharged at the rate of 50,000,000 gallons daily; of this 1 per cent. or 500,000 gallons is used by the company. A 15-horse-power steam engine throws the sewage into mixing tanks made of concrete, which are about 50 ft. long, 20 ft. wide, and 8 ft. deep. The details of the process, together with the sanitary and agricultural results, are given in the "Quarterly Journal of Science" for January, 1873. Disposal by dry pulverized earth in movable boxes has many advocates, who think that it could be advantageously applied to large towns; but it is the general belief that it is only adapted to those of considerably less than 100,000 inhabitants, requiring as it would the bringing in daily of dry earth to the amount of from 5 to 10 lbs. for each individual. The pneumatic system of disposal and utilization devised by Capt. Liernur has been applied at Amsterdam, Leyden, and other towns in Holland, where the disposal of excreta by water-carriage sewage is highly objectionable in consequence of the level of the canals being lower than that of the sea. It consists of the ordinary sewers for surface and house draining, and a second pipe system connected with an apparatus for manufacturing immediately and without loss the excreta into poudrette. The outlines of the process may be briefly stated as follows: The earthen hoppers of the houses are so constructed that the excreta fall to the lowest level of the soil pipe. Each hopper is covered with a rubber-seated lid, and is connected with a ventilator which passes up through the roof. At street corners, under ground, are large iron air-tight tanks, to a single opening in each of which all neighboring house pipes converge, this opening being closed with a gate. These tanks are connected in turn with large tanks at the great central sewage works of the cities. By means of air pumps a vacuum is created in the great tanks, and the gates of the pipes leading to the common receptacles being opened, the air is quickly removed from them and a vacuum created in each. The gates between them and their connecting house pipes being now opened, the matter within them is exhausted into the corner receivers, to be transferred to the great tanks at the central station, where it is manufactured into poudrette. This is accomplished by allowing the sewage to run into retorts perfectly fresh, all houses, tanks, pipes, &c., being emptied every few hours, mixing it with a small percentage of sulphuric acid to fix the free ammonia, and then running it into troughs in which revolve large

copper cylinders heated to a high degree, and the whole working in covered jackets. A thin layer of sewage is taken on at each turn of the cylinder, and by its heat is converted into dry poudrette, which is scraped off by a knife at the end of one revolution, and falls into a trough. No water is used in the house closets except the urine. The pipes being closed below and ventilated above, effluvia cannot escape into the houses, and there is no escape of sewer gas anywhere but at the central station under the furnace fires. The system, although embracing considerable outlay, is said to be not only self-supporting, but profitable, and to be extending over Europe.—See F. C. Krepps, "The Sewage Question" (London, 1867); Baldwin Latham, "Sanitary Engineering" (London, 1873); and Dr. Whitty, "On the Water Supply and Sewerage of Jerusalem."

SEWING MACHINE, a mechanical contrivance for uniting fabrics by means of needle and thread. The earliest inventions for this purpose were attempts to imitate hand sewing, making a running through-and-through stitch with but a needleful of thread. This being impracticable in consequence, among other defects, of the wearing of the thread, it was sought to produce the old crochet stitch by means of machinery. The first needle suitable for use in sewing machines was introduced by Charles F. Weisenthal, to whom a patent was granted in England June 24, 1755. It was pointed at both ends, with an eye in the middle, for passing each way through the cloth without being turned around; but it was only used for hand embroidery. The first application of machinery was contained in a patent to Robert Alsop in England, dated March 22, 1770, for embroidering in a loom with one, two, or more shuttles. Machine embroidery with a large number of needles was patented by John Duncan, May 30, 1804. He used hooked needles, attached in a straight line to a horizontal bar, the forward motion of which carried all the hooked ends through the cloth, when, on being supplied with thread by a feeding needle, the reverse motion carried back loops which passed through and secured those of the previous stitch. Patterns were worked by a sliding motion of the fabric with its vertical frame. This was the first important step in embroidering machinery, which was carried to great perfection in the machine of Heilmann. This however used Weisenthal's two-pointed needle with the eye in the middle, and also nippers to pull the needle through, afterward used by Greenough. There has lately been found in the archives of the English patent office a patent for a sewing machine made by Thomas Saint, dated July 17, 1790, which has excited considerable interest and surprise in consequence of its possessing many of the elements of successful modern sewing machines. This might have been used to some extent for sewing leather, but could not have succeeded with woven fabrics containing fibres,

for they would have been caught in the forked needle by which the thread was pushed through. It was intended, as the patent states, "for quilting, stitching, and making shoes and other articles by means of tools and other machines." It had an arm, upon the overhanging end of which there was a vertically reciprocating straight needle. The arm also supported a spool which gave out its thread continuously. It had a horizontal cloth plate, made a chain or crochet stitch, and had thread tighteners above and below. In fig. 1, representing this machine, *a* is the bed plate, *b* an upright post bearing a horizontal overhanging arm, upon the end of which are placed a needle *f* and an awl *g*, which were adjusted by means of set screws, and moved by cams *h* and *i*, on the shaft *k*. The needle was notched at its lower end, to push the thread through the hole made by the awl, and thus form a loop. The work was supported on a box *l*, sliding between guides *m, m*, and moved by a screw *n*

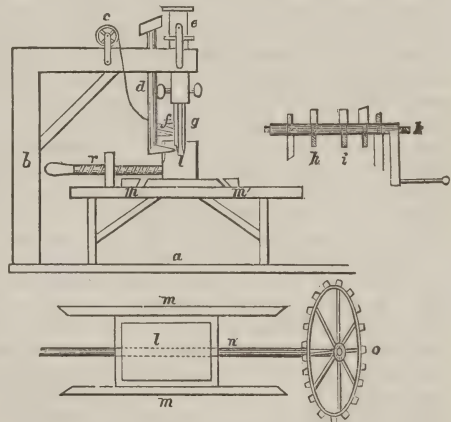


FIG. 1.—Saint's Sewing Machine, 1790.

turned by a toothed wheel *o*, which in turn was moved by an arm upon the shaft *k*. One loop was carried over the other by the bent point of the spindle *d* in a manner similar to that which has been employed in some chain-stitch machines. The screw *r* adjusted the box *l* on the guide plate. In 1830 B. Thimonier patented a sewing machine in France, 80 of which, made of wood, were in use in 1841 for sewing army clothing at a shop in Paris. They were destroyed by a mob, as the Jacquard loom and Hargreaves spinning jenny had been years before; but during the revolution of 1848 Thimonier was again at work with other machines capable of making 200 stitches a minute. The mob again broke up his establishment, threatened his life, and defeated his enterprise, and he died in poverty in 1857. Like that of Saint, his machine had a vertical needle descending from an overhanging arm, the fabric being fed upon a horizontal table by hand. The needle was driven

by a treadle instead of a crank as in Saint's machine, and was carried back by a spring. It had the form of a crochet hook, and being driven through the fabric caught a lower thread from a thread carrier and looper beneath, and brought a loop which it laid upon the upper surface, and at the next passage brought up another and passed it over the loop previously made, thus making a double loop or chain stitch, with the loops on the upper side. The Thimonier machine which was patented in France Aug. 5, 1848, and in the United States Sept. 3, 1850, was an improvement upon that of 1830, but retained its principal features, the needle being still worked by a treadle and spring. It is said that between 1832 and 1834 Walter Hunt of New York made a sewing machine in which he used an eye-pointed needle, attached to the end of a vibrating arm, which carried a thread through the fabric and made a loop which was pierced by a shuttle carrying another thread, making what is known as the lock stitch. When he applied for a patent in 1854 he was refused, because the main features which he claimed for his machine had been patented eight years previously by Elias Howe, and it was held that his right to a patent was forfeited by abandonment. A machine for making a through-and-through or shoemaker's stitch was patented Feb. 21, 1842, by J. J. Greenough of Washington. The needle was pointed at both ends, with the eye in the middle, and was drawn through one way and then the other by a pair of pincers travelling on a track and opening and closing automatically. It was designed for sewing leather and other hard material, and an awl pierced the hole in advance of the needle. The leather was held between clamps, which by means of a rack could be moved each way alternately to make a back stitch, or continuously forward to make the shoemaker's stitch. The needle was threaded with a length of thread, and required refilling. The rack, after passing forward its length, was each time set back. Another form of a through-and-through sewing machine employs fluted rollers, between which the cloth is drawn and crimped, and in this condition forced upon the needle and thence on the thread. In 1844 a patent was granted in England to Fisher and Gibbons for working ornamental designs by machinery, in which two threads were looped together, one passing through the fabric, the other looping with it on the surface without passing through. Curved needles were used beneath the fabric, and other needles with looped guides or retainers above, the several sets being arranged in a row across the machine. When the point of the curved needle ascended through the fabric, the point of the upper needle entered between it and its thread, and when the curved needle descended it left upon the upper needle a loop which was then pressed further on by the guide. The fabric was moved according to

the pattern required, when the curved needle again ascended and the upper needle passed its thread around it so as to be withdrawn through the loop previously on its stem. After this the upper needle, again advancing, entered between the curved needle and its thread as before, producing a highly ornamental double chain stitch.—Sewing machines may be divided into four classes, according to the character of the stitch they make: 1, those making the through, either continuous or back stitch; 2, those making the lock stitch; 3, those making a single-thread chain stitch, either the ordinary crochet stitch, or a twisted one called a twisted loop stitch; and 4, those making a double-thread loop or chain stitch. The through-and-through stitching machines, being no longer in use, will not be further described. The invention of the lock stitch has been claimed for Walter Hunt, but it has been generally conceded by sewing machine inventors that the machine of Elias Howe was independently devised; and as it had a more perfected construction and formed the basis upon which subsequent improvements were made, fitting it for a practically working machine, and obtained the first patent, he has been generally accredited as the originator of the lock-stitch machine. Howe's machine, as patented in 1846, used a grooved and curved eye-pointed needle, carried upon the end of a vibrating arm, which passing through the cloth formed a loop through which a shuttle passed another thread. The needle moved in a horizontal direction, the cloth being held in a vertical position by pins projecting from a baster plate, which was moved intermittently by a toothed wheel. On reaching the end of the plate, the machine was stopped, the baster plate returned to its original position, and the cloth again attached. This construction prevented the successful use of the machine. One of its serious wants was a device by which the cloth could be moved along in such a way as not to interfere with the functions of the needle, and this defect was then common to all sewing machines. Such a device is called the "feed," and was sought for a long time before the desired end was accomplished. One of the first steps was to make the needle vibrate vertically, and move the fabric along, or feed it on a horizontal plate, by the action of a notched wheel which rotated with its upper edge just passing through a slot in the horizontal plate. An intermittent motion was given to this wheel, which was sought to be so timed as to alternate with the passage of the needle through the cloth; but this arrangement was far from perfect, although it was for a time used with some success in the early machines made by Mr. I. M. Singer and others. It was not till the device known as the A. B. Wilson "four-motion feed" was introduced that this feature of the sewing machine approached perfection. This device consists in moving a serrated bar, in a slot in the horizontal plate upon

which the cloth is fed, in the direction of the four sides of a parallelogram. The teeth carry the cloth forward while moving horizontally a short space above the surface of the plate; the bar then drops (the second motion), then passes backward horizontally beneath the plate (the third motion), and rising brings the teeth through the slot and above the surface (the fourth motion). The directions of these motions are indicated in fig. 2. The motion which carries

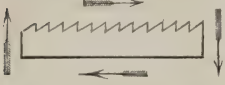


Fig. 2.—Four-motion Feed.

the cloth forward is so timed by cams upon a wheel, or by eccentrics or other devices, as to take place while the needle is raised above the cloth, and never to interfere with its passage. The four motions are obtained in the Willcox and Gibbs machine by a single eccentric, and the number of stitches to the inch may be determined by a device which employs a dial with numbers upon it, showing through an opening in the cloth plate. Most of the sewing machines now in use are lock-stitch machines, the stitch being precisely the same in all, and the principle upon which it is formed being nearly the same also. It is always made by passing loops of thread through



Fig. 3.—Lock Stitch.

the fabric by means of an eye-pointed needle, and then passing another thread through these loops, this latter part of the process being usually produced by means of a shuttle which is made to pass through the loops. When the shuttle thread is pulled back half way through the fabric, the stitch has the construction shown in fig. 3, where the threads are raised from the cloth to give a better view. It will be seen that the position of either thread is the same in relation to either side of the cloth; but when the loops formed by the needle are not drawn into the body of the fabric, the shuttle thread will lie straight on the under side of the cloth, as shown in fig. 4. The manner of making



Fig. 4.—Lock Stitch.

the stitch with the shuttle is shown in fig. 5. In most machines the needle vibrates in a right line, being carried by a vertically moving needle bar which slides in grooves. A shuttle bar carrying a shuttle underneath the cloth plate is made to pass through the loop, which opens to receive it when the needle begins to retract. The two bars, the needle bar and the shuttle bar, being actuated by the same motor, are so adjusted that their times of motion exactly correspond to each other. The shuttle, passing backward with its bobbin

while the loop is drawn up into the cloth, only carries its thread through the loops in one direction, and unwinds just as much thread at each passage as corresponds to the curved

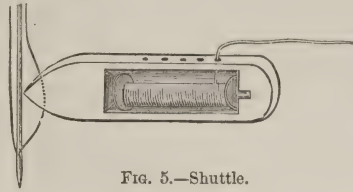


Fig. 5.—Shuttle.

length of the thread necessary to form a stitch. It is prevented from unwinding more than this by having the thread held by a device called a tension. The thread which is delivered by the needle is also held in the same way, in consequence of which the loop is retracted when the needle is drawn upward, the degree of retraction depending upon the tension, or the tightness with which the thread is held. The celebrated Singer and Howe machines are of this class, as also the well known Weed, Domestic, Florence, Remington, Wilson, American, Secor, and others. The Florence machine differs from the other lock-stitch machines in having a curved needle attached to the end of a vibrating arm, instead of being carried by a needle bar moving vertically in guides; and there are various ways of actuating the needle bars in all of them. Another form of lock-stitch machine, instead of causing a shuttle or movable bobbin to pass through the loop

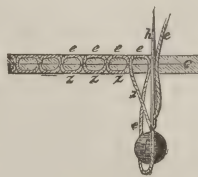


Fig. 6.

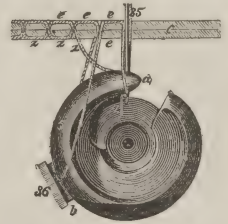


Fig. 7.

formed by the needle, catches this loop by means of a rotary hook and passes it over a stationary bobbin, which answers to the movable shuttle, and may be regarded as a stationary shuttle. The lock stitch of the Wheeler and Wilson machine may be made by hand, and its formation explained by reference to fig. 6. Take a piece of fabric, *c*, an ordinary needle, *h*, threaded with *e*, and a small ball of thread, *f*; tie the ends of the two threads together, thrust the needle threaded head first through the fabric, and instead of passing the ball of thread through the loop *e*, hold the ball and pass the loop around it; withdraw the needle and draw the interlocked portion of the threads, *e* and *f*, into the fabric. A succession of stitches thus made will form a seam. The lock stitch is formed by the machine in an

analogous manner. The upper thread *e* is carried by an eye-pointed needle (35, fig. 7), and a loop of it is thrust through the fabric by the needle; the loop is then entered by the point *a* of the rotating hook. The lower thread *z* is carried upon a thin metallic bobbin lying in the concavity of the hook, where it is held by a concave ring (not shown). The bobbin has no axis, so that a loop of thread can be freely passed around it. The loop of the upper thread is enlarged by the hook (fig. 8), and carried forward and around the bobbin containing the

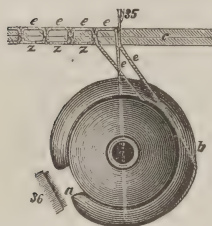


FIG. 8.

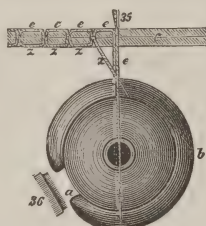


FIG. 9.

lower thread, as in fig. 9, and being drawn up as in fig. 8, in the process of enlarging the next loop, interlocks with it, and the point of interlocking is drawn into the fabric and forms a stitch. Wheeler and Wilson have made another form of lock-stitch machine, the invention of Mr. James A. House, which also employs a rotary hook, but completes a stitch at each revolution, drawing it up by a separate arm known as an independent "take-up." An eccentric attachment causes the hook to rotate more rapidly during one part of its revolution, and there is a "pad" or projection of steel on the revolving hook, or rather the wheel that carries it, by which the under thread is held firmly during a short period, which assists in the completion of the stitch. This produces the "tension," which can be regulated while the machine is in motion, and differs therefore from that just described in the family machine, which depends upon the friction of the revolving hook against the bobbin. The new machine is made of different sizes, some very large and strong, for heavy manufacturing work. The needle, being straight, is capable of penetrating stout leather. The medium sizes may also be used for tailoring as well as light domestic sewing.—The single-thread chain or crochet stitch is shown in fig. 10. It is formed by passing a thread through the fabric and making a loop, then making a second



FIG. 10.—Crochet Stitch.

loop and passing it through the first, and again making a third and passing it through the second, and so on. This may be done with

an eye-pointed needle and a reciprocating or vibrating hook, but does not form a very durable stitch, from its tendency to ravel. If, however, each loop is twisted, as shown in fig.



FIG. 11.—Twisted Loop Stitch.

11, ravelling is difficult, and when the work is well done not liable to occur, except by design. A mechanism for producing such a twist was patented by J. E. A. Gibbs of Millpoint, Va. A rotating hook causes the relations of the threads on each side to become changed toward each other. The different parts of the hook are shown in fig. 12, in which 18 is the shank, 19 the point of the hook, 20 the "cast-off," and 21 the heel; K K is the shield for protecting the thread from oil. In fig. 13 the needle, having descended to the lowest point, carrying down the thread, has just begun to ascend; and a loop is thrown off on the back

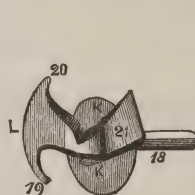


FIG. 12.

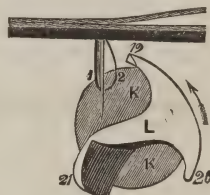


FIG. 13.

side of the needle just in time for the point of the hook to enter it. As the needle rises, the hook, moving in the direction of the arrow, passes into the loop, drawing it down and spreading it. As the hook advances from this point the loop begins to twist; thread No. 1,

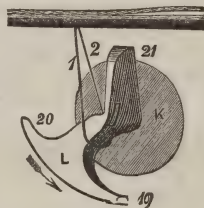


FIG. 14.

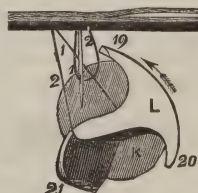


FIG. 15.

fig. 14, moving to the right, slides off the shoulder at the centre of the hook and falls down to the shank, near the shield K, while the heel, 21, catches the back side of the loop 2, and swinging it around passes into the loop which is being reversed. As the hook still advances and the heel passes further into the loop, thread No. 2 slides into the angle at the centre of the hook, as seen in fig. 15. The loop is now completely reversed, thread No. 2 being on this side of the needle, and

thread No. 1 on the back side. While the old loop thus twisted and spread out is held open on the body of the hook, the point 19 enters the new loop and carries it into the old one, as seen in fig. 16; and as the hook continues to revolve the cast-off, 20, passes out of the old loop and leaves it to be drawn up to the under side of the fabric, as in fig. 17, which completes the stitch. One feature of the machine consists in the application of what is called an automatic tension, lately devised and patented by Mr. Charles H. Willcox. Instead of subjecting the thread to a continuous tension produced by partially confining it in a

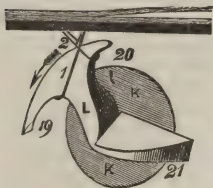


FIG. 16.

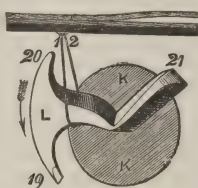


FIG. 17.

groove or clamp through which the motion of the machine draws it, it is made to pass between two disks held together by a spiral spring firmly enough to hold the thread inflexibly and draw it through the fabric to a definite distance until more is required to make a new loop, when it is instantly relieved by a little piston rod striking against the lower end of a rod attached to the upper disk. A uniformity in the drawing up of each stitch is thus secured, and as the necessity for change in tension when different sizes of thread or thicknesses of cloth are used is done away with, no provision is made for change by the operator.—The Grover and Baker machine makes what is called the double-loop stitch, employing two threads. Instead of passing a single thread through the loop formed by the eye-pointed needle in piercing the cloth, as in



FIG. 18.

the lock-stitch machines, a loop made by a circular horizontally moving needle (fig. 18) below the cloth is passed through the former loop, and the needle at its next descent passes through the loop formed by the lower needle, so that the stitch is really formed by 'passing a loop of one of the threads through that of the other. The construction of the stitch thus made will be understood by inspecting fig. 19, where the threads are widely drawn apart for the purpose of showing it. When the loops are properly drawn to their places underneath the cloth, a durable elastic stitch is produced, which is very desirable in elastic as well as other goods, and may be used with advantage in embroidery by using different sized threads.—In this article it has been sought to explain the actions of some of the principal sewing machines, without entering into the details of their construction or a de-

scription of the various attachments for hemming, felling, ruffling, cording, &c., or of buttonhole machines, which are either attachments

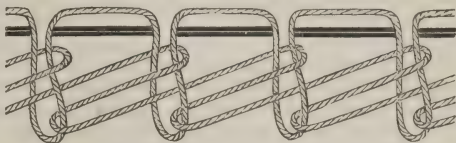


FIG. 19.

to sewing machines, or made specially for this work, and which are employed with more or less perfection of execution.

SEXTANT (the sixth part), an instrument used in nautical observations and in hydrographic and land surveying for measuring the angular distance between objects. Its principle and the manipulation of it, in its ordinary form, are explained in the article **QUADRANT**, which instrument it has entirely superseded for observations at sea, partly on account of its greater portability, but mainly because of its capability of measuring a wider range of angles. For important land surveys a full circle is preferred, of which there are the following forms: 1. A simple reflecting circle, made by extending the arc of the sextant to a whole circumference and producing the index arm so that it can carry a vernier on each extremity. Observations with this are free from the error of eccentricity, and in part from the accidental errors of graduation and of reading, since they are derived from the mean of two readings at opposite divisions of the arc. 2. The repeating reflecting circle, which differs from the first only in having its horizon glass and telescope fixed to the arm which revolves about the centre of the instrument, instead of permanently attached to the frame. By taking a sufficient number of cross bearings with this, errors of reading, eccentricity, and imperfect graduation are essentially eliminated. In theory, therefore, the repeating circle is very nearly perfect, capable of eliminating its own errors. But as we cannot pretend to measure "what we cannot see," the refinement of the circle is really thrown away so long as an optical power is used so feeble as that of the telescope now employed; for in fact its results do not surpass those of the common sextant so much as was expected from its theoretical perfection. 3. The prismatic reflecting and repeating circles, which differ from the above only in substituting for the horizon glass a glass prism, which is fixed on the line of sight behind instead of in front of the index glass. The advantage of this arrangement is that angles of all magnitudes can then be measured. These are the transformations which the sextant has undergone to adapt it for the varied requirements of the practical astronomer and surveyor on land; but to satisfy the demands of the nautical astronomer and hydrographic surveyor, changes even more radical and varied

have been made. To the navigator the sextant is invaluable; and in the special work of hydrography along a coast line, where the position of the boat or vessel is generally determined by observing from the boat, the sextant is the only available instrument of precision in use. And yet in its ordinary form it has certain deficiencies which prevent its universality of application. This fails to measure the angles between 140° and 180° , and the hydrographers of all countries have studied to remedy this defect, with varied success. M. Daussey, a very skilful French hydrographer, and Messrs. Piston and Martius, instrument makers of Berlin, have in different ways modified the form of the sextant so as to overcome this difficulty; but their instruments are embarrassing in their manipulation, especially when the objects are indistinct or the observation must be made from a boat continually disturbed by the action of the waves. Mr. T. J. Lowry of the United States coast survey has succeeded in removing this imperfection in the sextant, and has also made other improvements by which many other difficulties are overcome. The improved instruments are handled with the same facility as the old sextant, and are equally adapted to rough usage in a boat. By means of some additional glasses and certain improvements in the graduated arcs and verniers, the following objects are accomplished: any angle from 0° to 180° can be measured without inverting the instrument and while reflecting but one object; two angles, one to the right and the other to the left of an object, either angle being any number of degrees from 0 to 120, can be measured at the same instant. By certain additions which are easily made to the ordinary sextant, Mr. Lowry makes the instrument capable of measuring two angles, one to the right and the other to the left of the central object, in quick succession, without previously estimating their relative magnitudes, or inverting the instrument or lengthening its arc. Lastly, by a modification of M. Daussey's improvement, Mr. Lowry makes the ordinary sextant capable of measuring an angle and giving an inter-range at the same instant, and also of fulfilling many other conditions which M. Daussey's will not.

SEXTUS EMPIRICUS, a Greek philosopher, a native of Mytilene, in the first half of the 3d century A. D. His medical writings are lost; but his *Pyrrhoniæ Hypotyposes*, in three books, an exposition of the doctrines of the skeptics, and a treatise against the mathematicians, in 11 books, in which he attacks all the sciences, both physical and metaphysical, remain. An edition of both, with a Latin translation, was prepared by J. A. Fabricius in 1718. Bekker published an amended edition (Berlin, 1842).

SEYCHELLES. See MAURITIUS, vol. xi., p. 293.

SEYDLITZ, or Seidlitz, Friedrich Wilhelm von, a Prussian soldier, born at Kalkar, near Cleves, Feb. 3, 1721, died near Namslau, Silesia, Nov.

7, 1773. He excelled in horsemanship from his boyhood. After serving as a page of the margrave of Schwedt, he entered the Prussian army in 1739, and won the rank of major at Hohenfriedberg, June 4, 1745, and that of major general at the battle of Kolin, June 18, 1757. In the same year he was put in command of the cavalry, and distinguished himself at Rossbach, Nov. 5, at Zorndorf and Hochkirch in 1758, and especially at Kunersdorf, Aug. 12, 1759, where he was seriously wounded, and at Freiberg, Saxony, Oct. 29, 1762. He was then made inspector of the cavalry in Silesia, and in 1767 general of cavalry, to which branch of arms he had imparted a wonderful efficiency.—See *Leben des Generals von Seydlitz*, by Varnhagen von Ense (Berlin, 1834), and *Der General Friedrich von Seydlitz*, by Count Friedrich Wilhelm von Bismark (1837).

SEYFFARTH, Gustav, a German archæologist, born at Uebigau, Saxony, July 13, 1796. He studied at Leipsic, where in 1825 he became extraordinary professor of archæology. In 1824 he published *De Sonis Litterarum Græcarum* (Leipsic). He edited and continued Spohn's *De Lingua et Litteris Veterum Ægyptiorum* (2 vols., 1825-'31), and published *Rudimenta Hieroglyphices* (1826). His *Grundsätze der Mythologie* (1843) and *Untersuchungen über das Geburtsjahr Christi* (1846) involved him in bitter controversies. His peculiar theory of hieroglyphics he maintained against Champollion, and he now (1875) claims that the Champollionists have passed off his system as their own. In 1855 he emigrated to the United States, and was for six years professor in the Lutheran seminary of St. Louis. In 1857 he published at New York a "Summary of recent Discoveries in Biblical Chronology, Universal History, and Egyptian Archæology," both in English and German, and in 1860 a pamphlet in German refuting the chiliasts. He has for some time been engaged on a work entitled "The actual Historical Chronology of the Romans, Greeks, Babylonians," &c. His last publication is "Clavis Ægyptiaca, a Collection of all Bilingual and some other Hieroglyphic Inscriptions, translated and explained."

SEYMOUR. I. Edward, duke of Somerset, an English statesman, known as the protector Somerset, born about 1500, beheaded on Tower hill, London, Jan. 22, 1552. He was the eldest son of Sir John Seymour, and was educated at Oxford. After the marriage of his sister, Jane Seymour, with Henry VIII., he was created Viscount Beauchamp and earl of Hertford, and gradually became one of the most powerful noblemen about the person of the king, his prestige being strengthened by military successes in Scotland and France in 1544. He was one of the 16 persons appointed by Henry VIII. in his will to be his executors and the governors of the young king, Edward VI.; and in February, 1547, he was created duke of Somerset and earl marshal of England. On March 12

he was appointed by patent protector and governor of the king and his realms. His brilliant victory over the Scots at Pinkie, Sept. 10, greatly strengthened his influence, and for upward of two years after the accession of his nephew his authority was invested with all the attributes of royalty. His leaning toward the commons and his attempts to reform various social evils aroused against him a powerful party, headed by the earl of Warwick, who had been one of his most confidential counsellors; while the zeal with which he had promoted the unjust condemnation and execution for high treason of his brother, Lord Thomas Seymour, disgusted the people. On Oct. 14, 1549, he was deprived of the protectorship and committed to the tower, whence he was released, with a full pardon, Feb. 16, 1550. He resumed his place in the council, but in October, 1551, was again arrested through the influence of Warwick; and being convicted of felony committed in an attempt to imprison the latter, he was executed. Somerset was sincere and consistent in his attempts to establish the doctrines of the reformation in England, and his government afforded protection to refugees, both political and religious. (See EDWARD VI.) **II. Lady Jane**, sister of the preceding, and third queen of Henry VIII., born about 1510, died Oct. 24, 1537. She was a maid of honor to Queen Anne Boleyn when the king first fell in love with her, was married to Henry on the day succeeding Anne's execution, and died 12 days after giving birth to Edward VI.

SEYMOUR, Horatio, an American statesman, born in Pompey, Onondaga co., N. Y., May 31, 1810. When he was nine years of age his parents removed to Utica. He was educated at the academies of Oxford and Geneva, N. Y., and Partridge's military school, Middletown, Conn., studied law, and was admitted to the bar in 1832. The death of his father devolved upon him the settlement of a large estate, and withdrew him from the practice of his profession. From 1833 to 1839 he served on the military staff of Gov. Marcy. In 1841 he was elected to the state assembly as a democrat, was reelected three times, and in 1845 was chosen speaker. In 1842, while in the assembly, he was elected mayor of Utica for one year. In 1848 he supported Lewis Cass for the presidency. In 1850 he was nominated by the democrats for governor, and was defeated by Washington Hunt, the whig candidate, by a plurality of 262 votes; but in 1852 he was elected governor by a plurality of 22,596 votes over the same competitor. A prohibitory liquor bill passed in March, 1854, was vetoed by him on the ground that it was unconstitutional. He was renominated in 1854. The prohibition question entered largely into the canvass, which was further complicated by the Know-Nothing issue and the anti-slavery agitation growing out of the repeal of the Missouri compromise. There were four candidates

for governor, and Myron H. Clark, whig and prohibitionist, was elected by a plurality of 309 votes over Gov. Seymour. In 1862 Mr. Seymour was again elected governor over Gen. James S. Wadsworth by a majority of 10,752 votes. In his inaugural address on Jan. 1, 1863, he said: "Under no circumstances can the division of the Union be conceded. We will put forth every exertion of power; we will use every policy of conciliation; we will guarantee them every right, every consideration demanded by the constitution and by that fraternal regard which must prevail in a common country; but we can never voluntarily consent to the breaking up of the union of these states or the destruction of the constitution." On June 15 Secretary Stanton, by direction of President Lincoln, telegraphed to Gov. Seymour asking if he could raise and forward 20,000 militia to assist in repelling the threatened invasion of Maryland and Pennsylvania by Lee's army; and within three days 12,000 soldiers were on their way from New York to Harrisburg. While these troops were absent from the state the draft was ordered to be enforced in the city of New York on July 11. On the 9th Gen. John E. Wool, commanding the department of the East, addressed a letter to Gov. Seymour setting forth that the city of New York was in a defenceless condition, and asked that he might be furnished with four companies of infantry. These companies were on their way thither from the interior of the state when Gen. Wool telegraphed, July 13: "Please countermand any militia that is ordered to this place." On the same day the draft riots began. The governor immediately went to New York, where on the 14th he issued two proclamations, one calling on the rioters to disperse, and the other declaring the city in a state of insurrection. He divided it into districts, which were placed under the control of military men who were directed to organize the citizens; and 3,000 stand of arms were issued to these and other organizations. Boats were chartered to convey policemen and soldiers to any point on the shores of the island where disturbances were threatened. The governor visited all the riotous districts in person, and by persuasion as well as by the use of the force at his command aided in quelling the disturbance. During his term Gov. Seymour commissioned more than 13,000 officers in the volunteer service of the United States. In 1864 he addressed a message to the legislature advocating the payment of the interest on the state bonds in gold; and the refusal of the legislature to adopt this policy greatly depreciated their value. In August he presided over the democratic national convention at Chicago, which nominated Gen. McClellan for the presidency. He also presided over the convention of 1868, held in New York. The leading candidates for the nomination were George H. Pendleton, Andrew Johnson, Thomas A. Hendricks, and Gen. W. S. Han-

cock. Gov. Seymour had positively declined to permit the use of his name as a candidate; but on the 22d ballot the Ohio delegation, to forestall a threatened movement in favor of Salmon P. Chase, cast their united vote for Horatio Seymour. When Wisconsin was reached in the call of states its delegation seconded his nomination, and every state changed its vote to Seymour, who was declared the unanimous choice of the convention. Gen. Francis P. Blair, jr., was nominated for vice president. At the election Seymour and Blair received 2,703,600 votes, against 3,013,188 votes for Grant and Colfax. Mr. Seymour lives on an extensive and well cultivated farm in Deerfield, near Utica. He is president (1875) of the national dairymen's association, and has delivered many addresses before agricultural societies. He is also president of the prison association of the United States.

SFORZA, an Italian family, several members of which were sovereign dukes of Milan during the 15th and 16th centuries. **I. Giacomuzzo Attendolo**, the son of a peasant and the founder of the house, born at Cotignola, in the Romagna, in 1369, died in 1424. He became one of the most redoubtable condottieri of Italy, and was surnamed Sforza on account of his muscular strength. He fought in the service of various princes, and Queen Joanna II. of Naples made him grand constable. In 1420, yielding to the influence of Pope Martin V., who had made him a count, he aided Louis III. of Anjou against the queen; but soon returning to Joanna, he protected her against Alfonso of Aragon, and while marching against Braccio di Montone was drowned in the Pescara. **II. Francesco**, duke of Milan, natural son of the preceding, born in 1401, died in 1466. He succeeded his father in the command of the mercenary bands upon whom his power rested. Enlisting in 1425 in the service of Filippo Maria Visconti, duke of Milan, then at war with a formidable league headed by the republic of Venice, he was defeated at Macalo by Carmagnola in 1427, but vanquished him in 1431 at Soncino. Under pretence of giving force to the decrees of the council of Basel against Eugenius IV., he wrested the province of Ancona from the pope. Entering the service of the Florentine republic against Visconti, he beat the Milanese under Piccinino and conquered Lunegiana in 1437; returning to his former ally, was sent by him to Naples to support René of Anjou against Alfonso of Aragon; then going over again to the Venetians, defeated Visconti in 1440, and invaded his territory; and finally, receiving the hand of the duke's illegitimate daughter Bianca, forced Florence and Venice to grant that prince the peace of Capriana (1441). Visconti treacherously attempted to crush his son-in-law by forming a league of nearly all the Italian princes against him; but, concentrating his whole force in the province of Ancona, Sforza routed his enemies at Monte Lauro and Mont' Olmo in 1444;

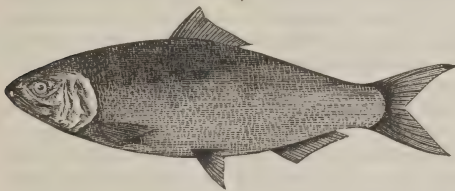
and when, notwithstanding these successes, he was on the eve of succumbing to superior forces, he received timely aid from the republic of Venice and from Florence, now under the control of his friend Cosmo de' Medici. On the death of Visconti without a male heir in 1447, the Milanese adopted a republican government; but Sforza, after serving the republic for a time, seized its principal towns, blockaded Milan, and in 1450 was proclaimed duke. Venice and Naples refused to acknowledge his title; but he defeated the former in a short war, made peace and contracted an alliance with Alfonso of Aragon, king of Naples, made himself master of Genoa in 1464, and secured a controlling influence in all Italy. His protection of science and literature, his liberality toward the learned exiles from Constantinople, and the public improvements accomplished under his reign, entitle him to a high rank among the princes of his age. **III. Galeazzo Maria**, son and successor of the preceding, born in 1444, assassinated in 1476. He was serving Louis XI. of France at the time of his father's death, and returned hastily in disguise to Milan, where, owing to his mother's energy, he was proclaimed duke; but he gave himself up to luxury and debauchery, and was charged with poisoning his first wife and his mother. His second wife was Bona of Savoy, sister-in-law of Louis XI. He was assassinated by three conspirators, and Giovanni Galeazzo, about eight years old, was proclaimed duke under the regency of his mother. **IV. Ludovico**, called *Il Moro*, brother of the preceding, born in August, 1451, died in 1508 or 1510. In 1479 he assumed the title of regent in Milan. His nephew, a son-in-law of Ferdinand, king of Naples, being treated as a prisoner, Ferdinand was arming against Ludovico, when the latter in 1494 invited Charles VIII. of France to undertake the conquest of Naples; and Galeazzo dying soon after, Ludovico proclaimed himself duke. He now formed a league of all the northern powers of Italy to prevent Charles's return from Naples; but the French baffled his efforts, and in 1499 he was attacked by Louis XII., who claimed the duchy in the right of his grandmother Valentina Visconti, and being forced to fly from Milan took refuge at Innspruck, with the emperor Maximilian. The French gave such dissatisfaction to the Milanese that, with the aid of mercenary Swiss troops, Ludovico was enabled to reconquer his duchy; but on a new invasion of the French in 1500, he was taken while trying to escape, and confined for life in the castle of Loches. **V. Massimiliano**, son of the preceding, born in 1491, died in June, 1530. He was made duke by the "holy league" in 1512, after the expulsion of the French, but was overthrown on their return in 1513. On the defeat of the French army at Novara he reëntered Milan, but finally lost his crown in 1515, when Francis I. of France won the victory of Marignano (Me-

legnano), and gave up all his rights to it on condition of receiving a pension, and went to France. **VI. Francesco II.**, younger brother of the preceding, born in 1492, died Oct. 24, 1535. In 1522 he received the duchy in fief from the emperor Charles V., but made himself odious by imposing onerous taxes. He left no issue, and the duchy reverted to Charles V.

'SGRAVESANDE. See GRAVESANDE.

SHACKLEFORD, an unorganized N. W. county of Texas, intersected by the Clear fork of the Brazos river; area, 900 sq. m.; pop. in 1870, 425, of whom 55 were colored. Stock raising is the chief occupation.

SHAD, a well known fish of the herring family, of the genus *alosa* (Cuv.), differing from the herrings proper (*clupea*) in having the centre of the upper jaw deeply notched. The lower jaw is the longer; the teeth are small and deciduous, in the jaws only; the air bladder is simple, opening from the stomach. The genus comprises more than 20 species, among which are the alewife, blue-back, menhaden, and shad herring. The American shad (*A. præstabilis*, De Kay, or *A. sapidissima*, Storer) attains a length of about 20 in., and varies in weight from 2 to 6 lbs.; the upper parts of the



American Shad (*Alosa præstabilis*).

sides and gill covers are coppery, lower part of sides silvery, abdomen pearly, and top of head and back bluish; a more or less distinct black blotch at the posterior angle of the gill cover; irides silvery; dorsal on anterior part of back, quadrangular, transparent, and shutting in a groove; pectorals and ventrals small, and anal low and partly received in a groove; caudal deeply forked, with a patch of small scales and two membranous appendages at its base; scales large, and abdominal ridge serrated. They come from the south to deposit their spawn, running up the rivers from the sea; they appear at Charleston in January, at Norfolk in February, at New York by the end of March or beginning of April, at Boston by the end of April, and in the bay of Fundy by the middle of May. They appear in the Massachusetts rivers early in May, the greatest run being when the apple trees are in full blossom; the shad fly (*hemerobius*) appears at the same time, covering the houses and fences; the old return to the sea in August, and the young, 3 or 4 in. long, migrate in September. It is a common belief that the life of the shad is limited to a single year. The Massachusetts fish commissioners in 1874 hatched great numbers of shad in the Merrimack river at North Andover. The

number caught there in that year was 1,680, which furnished 6,249,000 spawn; of these 3,500,000 were hatched and distributed in various waters of the state. The average of the yield of eggs was 10,278 to each female. For other efforts toward the propagation of shad, see FISH CULTURE, vol. vii., pp. 219 and 222. In the Delaware and Hudson rivers, whence New York is mainly supplied, the shad fishery is prosecuted by drift and stake nets, and its commercial value is considerable. The fish are with us mostly eaten fresh, and are delicious, the only drawback being the innumerable bones; they lose their flavor the longer they remain in fresh water. They will rise to a gaudy fly in fresh water, and afford very exciting sport. Their food in salt water consists principally of worms like the shad or slug worm, and shrimps. The shad fishery is of considerable importance to the British provinces; in the upper part of the bay of Fundy, on the New Brunswick side, the fishing is mostly carried on in the channel by drift nets from 25 to 30 fathoms long, sinking to a depth of about 16 ft., with meshes of $4\frac{1}{2}$ to 5 in.; it continues from July to the middle of September; the fish are split and salted, and mostly used in the neighborhood. Shad are sometimes caught in standing weirs set on the flats, but these soon destroy the fishery, as fish of all sizes are taken; in standing nets many fine fish are lost by falling out unless narrowly watched. Stake nets are each about 100 fathoms long, set on stakes or poles about 15 ft. apart on the mud flats, and are dry at low water; most of the fish in these are caught on the ebb tide. This fishery is also of importance on the Nova Scotia side of the bay of Fundy; shad are also taken in the gulf of St. Lawrence.—The hickory shad (*A. lineata*, Storer) is about 15 in. long, silvery on the sides, with six or eight indistinct bluish longitudinal bands; it is lean, and is not used for food.—The European shad (*A. vulgaris*, Val.) ascends the Thames and the Severn, the Elbe, Rhine, Seine, Loire, Garonne, Volga, and other rivers, from the Atlantic and other seas, in numerous troops during the spring, varying greatly from year to year. It attains a length of 2 to 3 ft., and is dark green above and silvery below, with a dusky patch behind the gill covers; its flesh is little esteemed in England. Cuvier and Yarrell describe the *A. finta*, the twaite shad or May fish, about 14 in. long, with teeth in both jaws and several black spots on the sides, and a dry insipid flesh. Valenciennes maintains that this is only the young of the *A. vulgaris* before the teeth have fallen, and declares that only one species is found in the waters of Europe.—The head of the shad presents a good example of the water tubes through which, in many fishes, fluid is introduced into the blood and the system generally; the object of this apparatus, often very extensive, is commonly said to be for accommodating the body to the pressure of different ocean depths.

SHAD BUSH. See JUNE BERRY.

SHADDOCK, a fruit of the *citrus* or orange genus, noted for its great size. In treating of other members of this genus the difficulty of tracing the commercial varieties to botanical species has been alluded to, and the same doubt surrounds the shaddock. The fruit was brought from Asia to the West Indies by an Englishman, Capt. Shaddock. De Candolle is disposed to regard it as a species, not on account of the size of the fruit, but because the leaves are downy on the under side and ciliate on the margins. The shaddock is a native of China and Cochin China, but is thoroughly established in the West Indies, where it presents many varieties. The tree and fruit are



Shaddock (*Citrus decumana*).

much larger than those of the common orange, but it can hardly be regarded as a valuable fruit, as its quality is very inferior. Its specific name, *decumana* (Lat., immense), refers to its size, the fruit of shaddock often weighing 6 or 8 lbs.; it is mainly useful in making up ornamental collections of tropical fruits.

SHADWELL, Thomas, an English dramatist, born in Norfolk in 1640, died in 1692. He was educated at Cambridge, settled in London, and wrote for the stage. He obtained so great a reputation as a writer that he was set up as a rival of Dryden, on whose dismissal in 1688 he became poet laureate. He is now chiefly known as the hero of Dryden's satire of "MacFlecknoe;" but the dulness there ascribed to him is altogether imaginary. His

works were published collectively in 1720 (4 vols. 12mo).

SHAFTESBURY. **L. Anthony Ashley Cooper**, first earl of, an English statesman, born at Wimborne St. Giles, Dorsetshire, July 22, 1621, died in Amsterdam, Jan. 22, 1683. His father was Sir John Cooper, of Rockbourne, Hants, and his mother Anne, daughter of Sir Anthony Ashley, Queen Elizabeth's secretary of war. He studied at Exeter college, Oxford, and at Lincoln's Inn, and represented Tewkesbury in the short parliament of 1640. In the civil war he first supported Charles I., but in 1644 went over to the parliament, raised a force in Dorsetshire, stormed Wareham, and reduced the surrounding country. He was a member of Cromwell's parliaments, and was appointed by the Barebones parliament one of the council of state, though openly opposed to many of Cromwell's measures. He retired from the council in 1654, and was a leader of the opposition in parliament both before and after Cromwell's death. He was active in the overthrow of the second protectorate and the restoration of Charles II., being a member of the commission sent to Breda to invite his return, and was appointed governor of the isle of Wight, lord lieutenant of Dorsetshire, chancellor of the exchequer, and a privy councillor, and in April, 1661, was created Baron Ashley. He was one of the commission for the trial of the regicides, whom he prosecuted with zeal. In 1667 he was made joint commissioner of the treasury. His title furnished the second letter for the name Cabal given to the Clifford ministry (see CABAL), and he has been charged with the scheme of shutting up the exchequer. In 1672 he was created earl of Shaftesbury and made lord chancellor. He had no legal knowledge, was ignorant of his duties, and servile to the king. Suddenly he began to oppose the government of which he was a member, and the king dismissed him (1673). His opposition now became very violent, and in 1677 he was committed to the tower, where he remained more than a year, and was not released until he begged pardon on his knees. Oates's "popish plot" made him powerful, and he was the author of the test bill of 1678, under which Catholics were excluded from parliament during 151 years. As president of the new permanent council he became nominal chief of the government; but, aware of the instability of his condition, he determined that the duke of York should be excluded from the succession. In 1679 he framed and caused to be passed the *habeas corpus* act. Parliament being dissolved and Shaftesbury dismissed, he became more violent than ever, induced Monmouth to return home, and tried to procure the indictment of the duke of York as a recusant. In the parliament of 1679 the commons were completely under his influence, and he carried resolutions against the duke of York, and caused the exclusion bill to be again brought forward, which rapidly passed

the lower house, but was thrown out by the lords. The king again dissolved parliament, and the next one met at Oxford; but Shaftesbury being still all-powerful in the commons, it was soon dissolved (1681). The earl was arrested by order of council on the charge of high treason, and the benefit of his own *habeas corpus* act was denied him; but the grand jury threw out the bill, and the earl was liberated. He left England, and reached Amsterdam in 1682, where he was admitted to the magistracy. This secured his personal safety, and for the remainder of his life he lived in splendor. He wrote memoirs of his own times, and intrusted them to his friend John Locke, who destroyed them, frightened, it is said, by the execution of Algernon Sidney. His life was written and privately printed under the direction of his great-grandson (new ed., 1836). See also "Life of the first Lord Shaftesbury," by W. D. Christie (London, 1871). **II. Anthony Ashley Cooper**, third earl of, grandson of the preceding, born in London, Feb. 26, 1671, died in Naples, Feb. 15, 1713. He entered parliament in 1693, and made a famous speech in behalf of the proposal to allow counsel to persons charged with high treason. Illness compelled him to retire from public life in 1698. He entered the house of lords in 1700, supported the measures of William III., and on the king's death retired. He was a philanthropist and a leading free thinker, and wrote "A Letter on Enthusiasm" (1708); "Moralists" and *Sensus Communis* (1709); and "A Soliloquy, or Advice to Authors" (1710). A complete collection of his works was published under the title "Characteristics of Men, Manners, Opinions, and Times" (3 vols. 8vo, 1713). At the time of his death he was engaged in Naples upon a work on the arts of design. **III. Anthony Ashley Cooper**, seventh earl of, born April 28, 1801. He graduated at Christ Church college, Oxford, in 1822, was returned to parliament in 1826, and supported the administration of George Canning. He was repeatedly a member of the house of commons, and entered the house of lords in 1851. He has continually striven to improve the condition of the laboring classes, and has taken part in many religious and benevolent enterprises.

SHAG. See CORMORANT.

SHAGREEN (Pers. *sagri*, *shagrain*), a preparation of the skins of horses, wild asses, and camels, resembling parchment more than leather. It is a product of Astrakhan in Russia and the countries of the East. Thick strips are cut from the skins along the chine, and having been deprived of the hair and dressed in the usual process of currying, each one is stretched by strings fastened to its edges in a square wooden frame. It is kept moist, and is occasionally stretched still more, till it becomes smooth and tense as a drum head. While still moist, the hair side is sprinkled over with the hard shining black seeds of a species of *cheno-*

podium, and these being covered with a piece of felt or thick cloth, the seeds are pressed into the skin by trampling or by a simple press. The skin retaining the seeds is then dried in the shade, and being afterward beaten the seeds fall out, leaving the surface indented with their pits. The opposite smooth side is then shaved down nearly to the bottom of the pits, and on macerating the skin in water the depressions appear in little swellings on this side, which become hard with the rest of the skin when dried. The strips being steeped in a warm solution of soda, and cleansed with salt brine, they are ready for dyeing. Shagreen was formerly much used for sword scabbards, instrument and spectacle cases, &c.

SHARP, John Campbell. See supplement.

SHAKERS, the popular name of a religious sect who call themselves the "United Society of Believers in Christ's Second Appearing." They originated in England about the year 1770, but are now confined to the United States, where they have 17 societies and about 4,000 full members, besides some hundreds of novitiates. They were at first an offshoot from the Friends or Quakers, and generally held similar views relative to spiritual illumination, giving testimonies, objecting to the legal oath, to war, slavery, &c.; but in their theological ideas, as well as in their practice of celibate life, and in community of goods, they now differ entirely from the Friends. In 1747 some members of the society of Friends near Manchester, England, formed a distinct association, of which Jane and James Wardley were the leaders. Of this society the parents of Ann Lee were members, and in 1758 she became one of its adherents. For several years this little company were only remarkable for greater physical manifestations of their spiritual illumination than most of the assemblages of Quakers, such as dancing, shouting, trembling, speaking with tongues, &c. These manifestations excited the hostility of the populace, and even of some magistrates and clergymen, who charged them with thereby violating the sabbath. Several of the members, including the Wardleys and Ann Lee and her family, were imprisoned, fined, and roughly used. In 1770 Ann Lee professed to have received, by a special manifestation of divine light, those revelations in virtue of which her followers have ever since given her the name of Mother Ann, and have regarded her as a person inspired by the Christ of the female order, as Jesus was inspired by the Christ of the male order. Christ is applied by them, as a generic term, to the highest or innermost sphere, exterior to the deific sphere, called in the Scriptures eternity: "the high and lofty One that inhabiteth eternity." In 1774, under authority of a revelation to Mother Ann, ten of the more prominent members of the society, including Ann Lee, emigrated to America, arriving in New York Aug. 6; and eight of them subsequently settled at Niskayuna (now Watervliet), 7 m.

from Albany. Here they remained, without any considerable accession to their numbers, for 3½ years. In 1779 a religious excitement, or revival, occurred at New Lebanon, Columbia co., N. Y., accompanied by those extraordinary physical manifestations which subsequently characterized a similar revival in Kentucky. When these manifestations had subsided, in the spring of 1780, some of those who had been most affected by them visited Mother Ann at Watervliet, and there, as they believed, found the key to their religious experiences. The number of adherents to her doctrines increased rapidly up to the time of her death in 1784, and indeed for some years after.—The idea of a community of property, and of Shaker families or unitary households, was first broached by Mother Ann, who formed her little family into a model after which the general organizations of the Shaker order as they now exist have been arranged. In 1787 Joseph Meacham, formerly a Baptist preacher, who had been one of Mother Ann's first converts at Watervliet, collected her adherents in a settlement at New Lebanon, and organized them in this form, probably adding some principles not found in Mother Ann's revelations. Within five years, under the administration of Meacham, 11 Shaker settlements were founded, viz.: at New Lebanon, N. Y., which has always been regarded as the parent society; at Watervliet, N. Y.; at Hancock, Tyringham, Harvard, and Shirley, Mass.; at Enfield, Conn.; at Canterbury and Enfield, N. H.; and at Alfred and New Gloucester, Me. No other societies were formed till 1805, when three missionaries from New Lebanon visited Ohio and Kentucky, and were ultimately successful in founding four societies in Ohio (Union Village, Watervliet, White Water, and North Union), and two in Kentucky (Pleasant Hill and South Union). These settlements are composed of from two to eight "families," or households. A large house, divided through the middle by wide halls, and capable of accommodating from 30 to 150 inmates, is erected for each family, the male members occupying one end and the females the other. The property is owned by each family as a community. The societies all possess considerable tracts of land, averaging nearly seven acres to each member. They believe idleness to be sinful, and every member who is able to work is employed. They have usually very extensive gardens connected with their settlements, and the culture of flowers, medicinal herbs, fruits, and vegetables has been a favorite business with them; and they have dealt largely in garden and flower seeds, dried herbs, and medicinal extracts. Of late years they give more attention to agriculture and to manufacturing than formerly. The broom business is extensively carried on by all the societies. They usually have at their villages storehouses and separate buildings for dairy or mechanical purposes, a school house for the children they adopt or who come in with their

parents, and a meeting house or hall. Their schools are supplied abundantly with apparatus and libraries.—In their mode of worship they exercise both soul and body. The two sexes are frequently arranged in ranks opposite to and facing each other, the front ranks about 6 ft. apart. There is usually an address by one of the elders upon some doctrinal subject, or some practical virtue, after which they sing a hymn; then they form in circles around a band of singers, to whose music they "go forth in the dances of them that make merry." At times the excitement and fervency of spirit become very great, and their bodily evolutions, while maintaining the order and regularity of the dance and the music, are almost inconceivably rapid. They believe themselves to be frequently under the immediate influence of spirit agency, both of angels and of departed members of their own fraternity, who have advanced further in the work of the resurrection or redemption from the generative nature and order than those still in the body. They have a ministry, composed of two brethren and two sisters, who have the oversight of from one to four societies; also each family in every society has four elders, two brethren and two sisters, who have charge of the family. The temporalities of each family are cared for by two deacons and two deaconesses. There are three classes of members: 1. The novitiates, who, receiving the doctrines of the Shakers, and living up to the general requirements of their faith, still prefer to reside with their own families, and manage their own temporal concerns, for a time. They are not controlled by the society, either as to their property, families, or children, and enjoy their spiritual privileges in connection with it, unless they violate its rules and principles. 2. The junior class, composed of persons who have become members of the Shaker communities, and unite in their labors and religious exercises, but who have not relinquished their property to the society, or, if they have given the society the improvement of it, may at any time resume it, though without interest. 3. The senior class, comprising those who, after full experience of the system of the Shakers, voluntarily and deliberately consecrate themselves, their services, and all their property to the society, never to be reclaimed by them or their legal heirs. Those belonging to this class are called the church or senior order. No difference is ever made in this order on account of the amount of property any individual may have contributed. They, as well as all who retain their connection with the community, are amply provided for, in health, sickness, and old age.—The Shakers hold that the revelation of God is progressive; that in the first or antediluvian period of human history, God was known only as a Great Spirit; that in the second or Jewish period, he was revealed as the Jehovah, He, She, or a dual being, male and female, the "I am that I am;" that Jesus,

in the third cycle, made God known as a Father; and that in the last cycle, commencing with 1770, "God is revealed in the character of Mother, an eternal Mother, the bearing Spirit of all the creation of God." This last they regard as a revelation of God's affectional nature, as a manifestation of the divine love and tenderness. The Christs they believe to be also dual, male and female, supramundane beings. Jesus, in their system, was a divinely instructed, pure, and perfect man, and by virtue of his anointing became Jesus Christ. Among the doctrines of the new revelation are the immortality of the soul, which Moses never taught, and the resurrection of the soul, by which they understand the quickening of the germ of a new and spiritual life, after the death of the first Adamic or generative life. All who marry and are given in marriage, or who indulge in the earthly procreative relation, they term "the children of this world," and followers of the first Adam. They do not condemn them for living in the marriage relation, provided they confine its use simply to the purpose of procreation, the production of offspring being the only justification of sexual intercourse; all beyond that they designate as "the unfruitful works of darkness," and they sincerely condemn it as mere sensual gratification. But Shakers, as Christians, hold that they are called to lead a spiritual and holy life, not only free from all lust and carnal sexual indulgence, but even to rise above the order of natural and innocent human reproduction (proper enough for the "children of this world," and in a measure for gentle Christians), Shakers being the "children of the resurrection," daily dying to the generative nature, as Jesus and the apostles died to it, and thus becoming new creatures who are able to comprehend the "mysteries of God." Another doctrine, in which they believe "Christ instructed Jesus," is human brotherhood, and its development in a community of goods, according to the example of Jesus and his apostles. The doctrines of non-resistance, non-participation in any earthly government, and the necessity of a life of celibacy and virgin purity to a perfect Christianity, they regard as having been communicated to Jesus by a Christ Spirit; and, though neglected by the church in the past, of prime obligation to the true believer. The second appearing of the Christ, "without sin unto salvation," they believe to have taken place, through Mother Ann Lee, in 1770. She, "by strictly obeying the light revealed in her, became righteous even as Jesus was righteous. She acknowledged Jesus Christ as her Head and Lord, and formed the same character as a spiritual woman that he did as a spiritual man." The necessity for the appearing of Christ in the female form resulted from the dual nature of Christ and of Deity. "Still it was not Jesus nor Ann, but the principles already stated, which were the foundation of the second Christian church. Their importance is derived from the fact of

their being the first man and the first woman perfectly identified with the principles and spirit of Christ." This second appearing of Christ they hold to be the true resurrection state, and repudiate a physical resurrection as repugnant to science, reason, and Scripture. As they recognize four dispensations or cycles of human religious progress, so they believe there are heavens and hells to each cycle, which are still places of probation. The first dispensation, and its heaven and hell, were respectively for the good and wicked among the antediluvians, and the wicked of that cycle were "the spirits in prison" to whom Jesus preached in the interval between his death and ascension. The second dispensation (by Moses) was designed to teach by revelation God's truth pertaining to the earth-life chiefly. The second hell they name Gehenna, and consign to it the Jews and heathen who died before the coming of Jesus; the second heaven is paradise, where the thief on the cross had the promise of going after his death. They believe that a perfect system of agriculture, horticulture, and hygiene was gradually unfolded in the statutes of Moses, obedience to which, then and now, would give entire exemption from physical disease or bodily infirmity; and that the principles contained in those laws and statutes are to-day as binding upon all Christians as are the ten commandments. (The Shakers eat no pork.) All human sickness, they say, is the result of some physiological sin, direct or indirect, against the teachings of Moses. In proof of this position they cite the promise of Moses to Israel: in obedience, "the Lord thy God shall take all sickness away from the midst of thee;" but in disobedience, he will "bring back upon thee all the diseases of the Egyptians," of which they were afraid, and of which diseases Moses had cured them in the wilderness, by means of the physiological treatment under which he put at least 2,000,000 persons, giving them for food simple manna, for drink and bathing cold water, and to breathe the pure air in open well ventilated tents. The third dispensation is that of the church of the first appearing of Christ, and to its heaven Paul was caught up. The fourth heaven is now forming; in it Jesus and Mother Ann reside, and to it will all those go who have resisted temptation until all their evil propensities and lusts are destroyed, and the life of the generative natural man is dead in them, for such are born of God and cannot sin. No one but Jesus had ever attained to this previous to the second appearing of Christ in Ann Lee. It is the heaven of heavens, and to it will be gathered not only all who accept the doctrines of the Shakers in this world, and attain to the new birth, but all those in the lower heavens and hells who shall yet accept them; and when their decision is finally made, the lower heavens and hells and the earth will be destroyed, and only the fourth heaven for the true believers, and the fourth hell for the finally impenitent,

will remain. Each cycle has had its own Holy Spirit, the spiritual influx from the church in the heaven of that cycle to the inhabitants of earth at the time. They hold to oral confession of sins to God, in the presence of one or two witnesses, as essential to the reception of the power to forsake sin. They also believe in the power of some of their members to heal physical diseases, by means of prayer and dietetics. The Bibles of different races they consider as records of the most divine angelic ministrations to man (for they hold that the natural man never has seen and never will see God), and as more or less imperfect records of the religious experience and history of the Jews and other peoples. They believe that the mental and spiritual condition of those seers and prophets, whose prophecies form a considerable part of all Bibles, has materially modified the revelation, and that it has been further modified and impaired by the translators of the Scriptures; the book of Revelation has suffered less in this respect than any other, mainly because it is utterly unintelligible to the generative man, and could not be comprehended till the second appearing of Christ, as that was the only key to unlock its mysteries. The revelations of Ann Lee, and others of their ministers and elders who have been inspired by God to speak, they regard as valid and important.—The movement of the spiritualists has excited great hopes in their minds of a remarkable influx of disciples to Shakerism, inasmuch as they consider it a preparation of the people to receive their doctrines. Their increase during the present century has been moderate, only three societies having been formed within the past 60 years, and the growth of those previously in existence having been slow; but it is worthy of note that they are the only people on this continent, if not in the world, who have maintained successfully for nearly a century a system of living, one of the fundamental principles of which is a community of property. The Shakers are spiritualists in a practical sense. They hold Swedenborg as the angel of spiritualism mentioned in the 18th chapter of Revelation. He is their John Baptist. Spiritualism had very much subsided in the order until 1837, when a renewal of it occurred, lasting seven years. This was the commencement of modern spiritualism, four years before the Hydeville rappings. The spirits predicted that after performing a certain work in the world, they would return to the Shakers, and replenish their numbers from the ranks of the spiritualists. According to Elder Frederick W. Evans, this return of the spirits is now occurring in the form of world-troubling materialization. He visits the most trustworthy of the mediums, and invites them to Mount Lebanon to have their powers tested.—The Shakers have published since 1870 the "Shaker and Shakeress," a monthly, edited by F. W. Evans and Antoinette Doolittle, at Mount Lebanon, Columbia co., N. Y.

SHAKESPEARE, William, an English dramatist, born in Stratford-upon-Avon, Warwickshire, in April, 1564, died there, April 23, 1616. The exact date of his birth is not known; but as there is a tradition that he died on its anniversary, and as the parish record of Stratford shows that he was baptized April 26, 1564, and it was common at that period to baptize children on the third day after their birth, the 23d of that month has, with much probability, been assumed as the day of his birth. His father was John Shakespeare, probably the son of Richard Shakespeare, a well-to-do farmer of Snitterfield, 3 m. from Stratford. Traces have been discovered of the family's existence in various parts of that country as early as the 14th century. John Shakespeare was a substantial yeoman, who is called, in parish record and tradition, successively a glover, a yeoman, a gentleman and freeholder, a butcher, and a wool stapler or wholesale dealer in wool. He seems to have been a man of intelligence and character; for he passed through the offices of ale-taster, burgess, constable, affeerror, chamberlain, alderman, and high bailiff, to that of chief alderman and *ex officio* justice of the peace. Like many others of even higher rank than his at that time, he could not write his own name. He married Mary Arden, the youngest daughter of Robert Arden of Wilmecote, a hamlet partly in the parish of Stratford. The Ardens were of the acknowledged gentry of Warwickshire; their family was ancient, and of some note in the county. Robert Arden was a considerable landed proprietor, although his daughter Mary inherited from him only an estate of about 54 acres, called Ashbies, at Wilmecote, and a small interest in some other land and tenements near by, with £6 13s. 4d. in money, which was equal to about £40 at this time. The marriage took place in the latter part of 1557. William Shakespeare was the third child and the first son of a family of eight. He had three brothers, none of whom attained any distinction. In his infancy and early youth his father's circumstances were easy. He owned two houses, each having a garden and one a croft attached to it; he rented a small farm, and bought at least two more houses with gardens and orchards. The house in Henley street, Stratford, in which it may safely be assumed that he lived from his marriage, if not five years before it, until his death, was a pretty and commodious dwelling. It was divided into two, and allowed to go to ruin in the latter half of the 17th century. There was an endowed grammar school at Stratford, among the pupils at which we may safely assume, having the support of tradition, was the son of the high bailiff and chief alderman of the town. What amount of learning Shakespeare acquired before he entered active life has been much disputed. Certain critics, the most prominent of whom are Charles Gildon and John Upton, have asserted for him a very considerable

scholarship; others, at the head of whom is Dr. Richard Farmer, with much ingenuity and some reason, argue that he was ignorant of any language but that of which he was the greatest master. But his friend Ben Jonson, himself a very thorough and laborious, if not a very profound or variously learned scholar, said that Shakespeare had "small Latin and less Greek;" from which statement we may reasonably infer that he knew enough of the former language to master such passages of it as he encountered in the course of discursive reading (and in his day these were many), though not enough to read Latin authors for pleasure, and that he had the benefit of some instruction in the latter tongue. His notably frequent use of Latin derivatives in their radical sense favors this view. Of Italian and French he seems to have acquired some knowledge in his youth or early manhood. Shortly previous to 1578 John Shakespeare's affairs became much embarrassed. In that year he mortgaged his property; his assessments by the corporation were reduced to one third of those paid by other aldermen; he was next excused from paying anything for the relief of the poor; and finally an execution against him was returned "No effects," and another Stratford burgess was elected in his place, because he had long neglected to attend the "halls" or corporation meetings. He also, because he feared process for debt, which could then be executed on Sunday, remained away from church, and thus incurred suspicion of nonconformity. He however contrived to retain possession of his house in Henley street. Thus straitened in his means of livelihood, John Shakespeare would naturally seek to make his eldest son contribute something to the support of the family; and tradition tells us that he labored first with his father as a wool stapler and a butcher, and afterward as a schoolmaster and an attorney's clerk. The story that he was a butcher rests only on the relation of an old parish clerk, born too late to have any personal knowledge of the matter. That Shakespeare had more than a layman's knowledge of law, his plays afford evidence, the weight of which cannot be dissipated by the plea of the universality of his genius. Upon the authority of a tradition recorded by the Rev. Richard Davies, who died in 1708, Shakespeare was "much given to all unlikelihoods in stealing venison and rabbits." In his roivings he had fallen in with Anne Hathaway, the daughter of Richard Hathaway, a yeoman of Shrottery, a village near Stratford. This young woman, who was eight years older than Shakespeare, bore a daughter in May, 1583, of which he assumed the paternity by marrying the mother at some time after Nov. 28, 1582, at which date the bishop of Worcester granted a license for the marriage of "William Shagspere one thone partie, and Anne Hathwey of Stratford in the dioces of Worcester, maiden," upon "once asking of the bannes," the bride-

groom being at that time 18 and the bride 26 years old. Thus did Shakespeare find himself, the son of a ruined man, without a settled occupation, and lacking three years of his majority, a prospective father and the husband of a woman old enough to be his father's wife. We should not lightly pass over circumstances which he remembered long and sadly, as we learn from his sonnets, and by a passage in one of his plays ("Twelfth Night," act ii. sc. 4), written 18 years after, in the height of his reputation and his prosperity. How and where he lived with his wife, whether in Stratford or Shrottery, we do not know. Nor has it been discovered how long he lived with her; but Hamnet and Judith, twin children of William and Anne Shakespeare, were baptized at Stratford, Feb. 20, 1584-'5; after which we hear of no other offspring of this ill-starred union.—We know nothing positively of Shakespeare from his birth until his marriage, and from that date nothing but the birth of his three children until we find him an actor in London about the year 1589. Play-going was a favorite diversion in the days of Elizabeth, and in fact may be regarded as a means of popular amusement and instruction, which then supplied the place of the popular lecture, the light literature, and the newspaper of our day. The best players performed of course at London; but strolling bands went through the rural districts, and even the metropolitan companies sometimes travelled into the provinces. During Shakespeare's boyhood plays had often been performed at Stratford; and there is some reason to believe that several of his seniors among the youth of Stratford had gone upon the London stage. Besides his urgent need, his consciousness of dramatic ability, and his certainty of finding acquaintances in the London theatres, another motive has been furnished him by tradition. It is said that his poaching propensities led him to steal a deer from Sir Thomas Lucy of Charlecote, near Stratford, and that, being harshly treated by the knight, he revenged himself by a lampooning ballad which he stuck upon the gates of the park he had violated. The ballad, as it has come down to us, is coarse, though clever; it irritated Sir Thomas so much that he redoubled his persecution of Shakespeare, and being the most important man in that vicinity, he drove the poor lad out of Stratford. This story, first told by Rowe, on the information of Betterton the actor, in "Some Account of the Life of William Shakespeare," prefixed to his edition of the poet's works, is sustained by independent tradition. It has been attacked with vigor and ingenuity by those who would fain have the world believe that the boy Shakespeare neither stole deer nor wrote coarse lampoons; but its credibility has never been materially impaired, and it is certainly supported by the sharp cut at Sir Thomas Lucy in the opening of the first scene of "The Merry Wives of Windsor." Shakespeare probably arrived

in London in 1585 or 1586; the earlier date best according with all the facts and circumstances to be considered. One tradition says that he was received into the company at first in a very mean rank; and another that his earliest position was that of "a servitor," which is probable. Young players were then apprenticed; he would have been expected to begin as an apprentice; and apprentices were then called servants. Tradition also says that he began his London life by holding horses at the playhouse doors, a story which has neither probability nor concurrent testimony to support it. Be this as it may, his rise to eminence was rapid; though not as an actor, for he seems never to have risen above the position known on the French stage as "general utility." We are tolerably well informed by contemporary writers as to the performances of the eminent actors of that time, but of Shakespeare's we read nothing. There is a tradition that he played the Ghost in his own "Hamlet;" and it is recorded by Oldys that one of his younger brothers, who lived to a great age, when questioned in his last days about William, said that he could remember nothing of his performances but seeing him "act a part in one of his own comedies, wherein, being to personate a decrepit old man, he wore a long beard, and appeared so weak and drooping, and unable to walk, that he was forced to be supported and carried by another person to a table, at which he was seated among some company, and one of them sung a song." If this story may be believed, we know that Shakespeare played Adam in "As You Like It." There is a tradition also that he played kingly parts, for which his fine person and graceful bearing fitted him. We learn from Ben Jonson's own edition of his comedies (folio, 1616) that Shakespeare played a principal part in "Every Man in his Humour" when it was first performed in 1598, and also in "Sejanus" when it was brought out in 1603; but what characters he sustained in these plays we do not know. Shakespeare's pen seems to have been soon employed, but not at first in purely original composition. In his time there was an inordinate craving for new plays. Public taste was rapidly improving; and plays the subjects of which were popular were rewritten again and again to meet the demands of an advancing standard of criticism. Young lawyers and poets produced plays rapidly. Each theatrical company not only "kept a poet," but had three or four in its pay; and there was hardly a theatre which could not boast of as many of its actors who could write as well as act. There was a never-ceasing writing of new plays and furnishing up of old ones. Two, three, and even half a dozen playwrights were employed upon one drama, when haste was necessary for the theatre, or when the junto needed money, which was almost always. It was upon this field of labor that Shakespeare entered; not

seeking from it fame, but fortune; not consecrating himself to literature, but working for the wherewithal to return to the Stratford which he had left almost a fugitive to live there like a gentleman, under the very noses of the Lucys. It has been generally believed that Shakespeare on his arrival in London joined at once the company which played at the Blackfriars theatre, known as the lord chamberlain's servants, and that he wrote for no other. But although there is no doubt that he soon became engaged with that company, and although it is quite possible that he never played in any other, there seems to be reason for believing that he began his career as a dramatist by writing in company with Robert Greene and Christopher Marlowe, who were already playwrights of established reputation, and who wrote chiefly for a company known as the earl of Pembroke's servants. In conjunction with them he appears to have written a part of the "Taming of a Shrew," of "The First Part of the Contention betwixt the Two Famous Houses of York and Lancaster," and of "The True Tragedy of Richard Duke of York," which he afterward rewrote alone, and brought out as his own, as "The Taming of the Shrew" and the second and third parts of "King Henry VI." He soon obtained that degree of eminence which insures the enmity of surprised, eclipsed, and envious contemporaries. The first public notice of him that has yet been discovered is the bitter sneer of an unworthy, dying, disappointed rival. Robert Greene, writing from the fitting deathbed of a grovelling debauchee, warns three of his literary companions to shun intercourse with actors, whom he styles "puppits that speake from our mouths, those anticks garnished in our colours." He goes on to say: "Yes, trust them not: for there is an upstart crow beautified with our feathers, that with his Tygres heart wrapped in a players hide, supposes he is as well able to bombast out a blanke verse as the best of you; and beeing an absolute *Johannes Fac-totum*, is, in his own conceyt, the only Shake-scene in a countrey." The allusion here to Shakespeare is unmistakable; the words "Tygres heart," &c., are slightly altered from a line which is found both in the "Third Part of King Henry VI." and in "The True Tragedy;" and the former play is plainly indicated as one of those in which the upstart crow is beautified with the feathers of Greene and of the friends whom he addresses, Marlowe, Lodge, and Peele. The letter in which this exhortation occurs was published in 1592, shortly after the writer's death, under the direction of his friend Henry Chettle. It gave offence to Marlowe and Shakespeare, as we know from a pamphlet published by Chettle three months after, in which he says: "With neither of them that take offence was I acquainted, and with one of them [Marlowe] I care not if I never be; the other [Shakespeare] . . . I am as sorry as if the original fault had

beene my fault, because myselfe have seene his demeanor nor lesse civill than he exlent in the qualitie he professes; besides divers of worship have reported his uprightness of dealing which argues his honesty, and his facetious grace in writting that approves his art." Thus we find Shakespeare at the age of 28, only between six and seven years after his departure from Stratford, in possession of the regard of his equals, the respect of his superiors, the admiration of the public, and the consequent jealous hate of his inferiors. From this time to the end of his career in London our knowledge of his life is confined almost exclusively to the production of his plays and poems; and the date at which these were written has in most cases to be inferred or conjectured. Before this time, in addition to his share in the old plays already named, and perhaps some others which are lost, including an older form of "The First Part of King Henry VI.," he had quite surely written "Titus Andronicus," "Love's Labor's Lost," "The Two Gentlemen of Verona," "The Comedy of Errors," and perhaps a part of an early and unpublished form of "Romeo and Juliet," and a part of "A Midsummer Night's Dream." In 1593 appeared his first published poem, "Venus and Adonis," in which the glow of youthful ardor is chilled, but not extinguished, by the cold and elaborate style in which, in imitation of the poets most in vogue at that time, he, going thus the way of all young authors, studiously wrote. This poem is filled with evidences of an intimate knowledge and genuine love of nature, and, apart from the attractiveness of its subject, it is not surprising that five editions of it were called for within nine years. It was dedicated to the earl of Southampton, who loved literature and the drama, and encouraged men of letters and even players. It is said that the poet received from him £1,000 as a free gift. As this sum at that time was equal to about \$30,000 in America to-day, the amount has probably been much exaggerated, possibly by the addition of a cipher. Rowe, who first told this story, says that Southampton gave the money that Shakespeare "might go through with a purchase which he heard he had a mind to;" and it has been reasonably conjectured that this purchase was an interest in the company to which Shakespeare attached himself soon after his arrival in London, and in which he became a principal owner. Mr. John Payne Collier produced in 1835, as one of several of a similar nature which he had discovered among the manuscripts of the earl of Ellesmere at Bridgewater house, a certificate dated "Nov'r 18, 1589," in which Shakespeare's name appears as the 12th in a list of 16 "sharers in the Blacke Fryers play-house." This document has been pronounced spurious by some of the most eminent and respectable palæographers and English scholars in England. If it is genuine, and Shakespeare was indebted to his noble patron for any share in the company, the

dedication was an acknowledgment of the gift, and not the contrary. In any case we may be sure that the poem was written some years before it was printed. In the dedication Shakespeare calls it "the first heir of his invention," and promises his patron to take advantage of all idle hours until he has honored him with some graver labor. In 1594 Shakespeare published "Lucrece," which he also dedicated to Southampton, saying: "The love I dedicate to your lordship is without end. . . . What I have done is yours; what I have to do is yours; being in part all I have devoted yours." Between 1592 and 1596 he probably wrote, and in this order, "Richard III.," "All's Well that Ends Well" (which seems to have been first called "Love's Labor's Won"), "A Midsummer Night's Dream" in its latest form, "King Richard II.," and "The Merchant of Venice." With the two last named plays begin the indications of that mental development of their author which has been called "the middle period" of his genius. "King John," the rewritten "Romeo and Juliet," "The First and Second Parts of King Henry IV.," "The Merry Wives of Windsor," "As You Like It," "Much Ado about Nothing," "King Henry V.," "Twelfth Night," and "Hamlet" (founded probably upon an older play) seem to have succeeded each other rapidly from 1596 to 1600 inclusive. "The Second Part of King Henry IV." is perhaps the most complete existing presentation of his many-sided genius. It is surpassed in some one respect by several of the comedies and tragedies; but in no other single play does the supremacy of his powers as poet, dramatist, philosopher, wit, and humorist so manifestly appear. In this history the character of Falstaff attains its highest development. The great tragedies were the fruit of the first decade of the 17th century. As several of them were not printed until the publication of their author's collected works after his death, the order of their production is not easily determinable. They, with two comedies, were probably produced in the following order: "Troilus and Cressida," "The Taming of the Shrew," "Measure for Measure," "Othello," "King Lear," "Macbeth," "Julius Cæsar," "Antony and Cleopatra," "Coriolanus;" but the last named tragedy was not improbably written after 1610. "King Lear," the grandest exhibition of its author's genius, may be safely attributed to the year 1605, when Shakespeare was 40 years old. Between 1610 and 1613 "Cymbeline," "Timon of Athens," "The Winter's Tale," "The Tempest," and "King Henry VIII." were produced; and about the latter year Shakespeare ceased to write. It is remarkable that among his very latest productions were two plays, in one of which, "The Tempest," he preserves the unities of time and place with classic tenacity, while in the other, "The Winter's Tale," he sets them at naught with a recklessness which has no parallel even in his pages. "Pericles,"

published in his lifetime as his, shows marks of his latest style, which increase in frequency toward its close; it is doubtless the work of another hand which he undertook to embellish. Of "The Two Noble Kinsmen," published in 1634 as by Fletcher and Shakespeare, there can be hardly a question that he was in part the author; but it was probably an old play to which he made additions, and to which again Fletcher, after Shakespeare's death, put a modifying hand. In addition to the works which have been enumerated, he wrote "A Lover's Complaint," a very charming amatory elegy, which bears the marks of his style in the earlier part of his "middle period;" some minor pieces, which were embodied in a miscellany called "The Passionate Pilgrim;" and his sonnets. These sonnets, though deformed with occasional conceits, far surpass all other poems of their kind in our own language, or perhaps in any other. To whom they were written, and in whose person, is among the most difficult of unsolved literary problems. They were published in 1609 with a dedication by the publisher to a "Mr. W. H.," whom he styles their "onlie begetter;" and who this begetter was no man has yet been able satisfactorily to show. Most of them are addressed in terms of the warmest endearment to a beautiful young man; many of them reproach, in the words of a man who is wroth with one he loves, a beautiful and faithless woman; a few belong to the class called "occasional." It has been ingeniously argued by Mr. Boaden that the gentleman so unceremoniously addressed by a bookseller as Mr. W. H. was William Herbert, earl of Pembroke; but Chalmers had almost as much reason for his notion that he was Queen Elizabeth in doublet and hose. Conjecture upon this subject has been various and futile; and it has been reasonably supposed, in the words of the Rev. Alexander Dyce, one of the most accomplished, learned, and candid of Shakespeare's commentators, that "most of them were composed in an assumed character, on different subjects and at different times, for the amusement, if not at the suggestion, of the author's intimate associates." This opinion as to their origin is sustained by the first quotation from Francis Meres given below. But the sonnets themselves forbid us to accept this theory as satisfactory.—Meagre as this record is, compared with the eminence of its subject, we have nearly approached the limits of our knowledge of Shakespeare's life. A century ago George Steevens wrote: "All that is known with any degree of certainty concerning Shakespeare is, that he was born at Stratford-upon-Avon, married and had children there; went to London, where he commenced actor, and wrote poems and plays; returned to Stratford, made his will, died, and was buried." The assiduous researches of 100 years have discovered little more than this. The antiquaries have found his name in a few public documents

and private letters, telling of the purchase of lands and tithes, the leasing of houses, and the borrowing of money. The notion for a long time prevailed, and to a certain extent still prevails, that Shakespeare was unappreciated and neglected in his lifetime, and owes his fame to the discovery of his genius by his posthumous critics. The fact is quite otherwise. We have seen what his reputation was both as an author and a man in 1592. His "Venus and Adonis," published in the next year, had run through five editions by 1602. Both it and "Lucrece" are highly extolled by contemporary writers. Spenser alludes to him in "Colin Clout," written in 1594, as one

Whose muse, full of high thought's invention,
Doth like himselfe heroically sound.

Francis Meres, in his "Palladis Tamia" (1598), said that "the sweete wittie soul of Ovid lives in mellifluous and honey-tongued Shakespeare; witness his 'Venus and Adonis,' his 'Lucrece,' his sugred sonnets among his private friends." "As Plautus and Seneca are accounted the best for comedy and tragedy among the Latines, so Shakespeare among the English is the most excellent in both kinds for the stage." And this was before his greatest works were written. Meres adds: "As Epilus Stolo said that the Muses would speake with Plautus' tongue, if they would speake Latin, so I say that the Muses would speake with Shakespeare's fine filed phrase if they would speake English." We know, too, that his plays were as attractive to the public as they were satisfactory to those critics who were not his rivals. Leonard Digges, born in 1588, tells us, in verses not published till 1640, that when the audience saw Shakespeare's plays they were ravished and went away in wonder; and that, although Ben Jonson was admired, yet when his best plays would hardly bring enough money to pay for a sea-coal fire, Shakespeare's would fill "cock-pit, galleries, boxes," and scarce leave standing room. Wealth was the sure result of such success; and so we find that as early as 1597 he had bought a fine mansion in his native town, built originally by Sir Hugh Clopton in the reign of Henry VII., and known as "the great house," and afterward as New Place. It was the largest and best house in Stratford, and as such, when in the possession of Shakespeare's granddaughter, Mrs. Nash, afterward Lady Barnard, was occupied by Queen Henrietta Maria in 1643, during the civil war. In 1597, also, Shakespeare opened a negotiation for the purchase of a part of the lease of the tithes of Stratford, which however was not perfected for some years, when he invested a sum equal to about \$13,000 in this public security. He otherwise increased in substance, and, like his own "Justice Shallow," had "land and beeves." In 1596 John Shakespeare obtained from the heralds' college a "confirmation" of an alleged previous grant of arms, in which confirmation it is said that

the grantee's "parents and late antecessors" "were for their valiant and faithful services advanced and rewarded of the most prudent prince Henry the Seventh." But no record of such advancement, or of the original grant of arms, has been discovered; and as these allegations were true of William Shakespeare's "antecessors" on the mother's side, it has been reasonably conjectured that the "confirmation" of arms was applied for by John Shakespeare at his son's instance, and procured by his influence. Tradition tells us that Shakespeare's memory clung to Stratford in the midst of his metropolitan triumphs and successes, and that he visited his family once a year. His townsmen respected and looked up to him, and in some cases leaned confidently upon his good offices in the way of influence and the advancement of money. We know nothing of his intercourse with actors and men of letters in London, save that he won gruff Ben Jonson to say in his "Discoveries:" "I loved the man, and do honor his memory on this side idolatry as much as any." And indeed, according to the tradition furnished by Betterton to Rowe, Jonson was indebted to Shakespeare for the reception and performance of his first play at the Blackfriars theatre. It had been tossed aside as the production of an unknown writer, when Shakespeare read, admired, and recommended it. Fuller says in his "Worthies" that the two friends had many "wit combats" together, in which he compares Jonson to "a Spanish great galleon," "solid but slow in his performances," and Shakespeare to an "English man-of-war, lesser in bulk but lighter in sailing." It has been supposed that these encounters took place at the Mermaid tavern, where a club met which Sir Walter Raleigh had founded, and of which Jonson, Beaumont, Fletcher, Selden, Donne, and others of their sort were members. There is no evidence whatever to show that Shakespeare ever met with this club; but it is extremely improbable that he was not a member of it. There is a tradition that King James was so much his admirer that he wrote him "an amicable letter" in autograph. It is not very improbable that James should have done so; and there is evidence of some weight to show that the letter was in the possession of Sir William Davenant, although at the beginning of the last century it had been lost.—Shakespeare is supposed to have abandoned the stage about 1604, and to have returned to Stratford to live at some time between 1610 and 1613. No record or noteworthy tradition of any event of importance or interest in this part of his Stratford life has reached us. Rowe says that he spent it "in ease, retirement, and the conversation of his friends," who were "the gentlemen of the neighborhood." We have no account of the manner of his death except the following entry in the diary of the Rev. John Ward, who was appointed vicar of Stratford in 1662, nearly 50 years after the

event to which it relates: "Shakespeare, Drayton, and Ben Jonson had a merie meeting, and it seems drank too hard, for Shakespeare died of a feavour there contracted." It is not impossible that this piece of gossiping tradition is true. Shakespeare was buried on the second day after his death, on the north side of the chancel of Stratford church. Over his grave there is a flat stone with this inscription, said to have been written by himself:

Good frend for Iesus sake forbear
To digg the dust enclosed heare:
Blest be ye man y^e spares thes stones,
And curst be he y^e moves my bones.

By whomsoever these lines were written, they have happily been effectual in keeping at Stratford what might otherwise have been carried to Westminster. Against the north wall of the chancel is a monument which was erected before 1623, and in which the poet's bust appears under an arch; his right hand holds a pen, and he appears to be in the act of writing upon a sheet of paper placed on a cushion before him. This bust, which is of life-size, was originally colored after nature. The eyes were of light hazel, the hair and beard auburn. The same Rev. Mr. Davies who records his "unluckinesse in stealing venison and rabbits," also writes that he died a papist; but, considering the extreme puritanical notions then prevalent, a very moderate degree of high churchmanship would be likely to be stigmatized among the people as papistry, especially in an actor. His works are imbued with a high and heartfelt appreciation of the vital truths of Christianity, without leaning toward any form of religious observance or of church government, or any theological tenet or dogma. His character seems to have been one of singular completeness, and of perfect balance. An actor at a time when actors were held in the lowest possible esteem, he won respect and consideration from those who held the highest rank and station; a poet, he was yet not only thrifty but provident. Surpassing all his rivals among his social equals, he was, after the recoil of the first surprise, loved by all of them. "Sweet" and "gentle" are the endearing epithets which they delighted to apply to him. His integrity was early noticed, as has already been remarked; and Jonson, in his "Discoveries," says he was "indeed honest, and of an open and free nature." In person he appears to have been no less agreeable than in mind. Aubrey heard that he was "a handsome, well shapt man." With this report the bust at Stratford, and the portrait engraved by Droeshout for the first collected edition of his works, agree. They are the only existing authentic portraits of him; and hard and poorly drawn as the latter is, there is a conformity between the two which sustains the authenticity of both. Both show a somewhat unusual length of upper lip; otherwise the features are remarkably well shaped and proportioned, and the head is

large and symmetrical. Many other portraits, some on canvas, two in bust form, and even lately one in the shape of a plaster mask, have been brought forward as representations of Shakespeare; but, whatever their pretensions, all of them fail just where the pedigree of the so-called Chandos portrait fails, in a direct connection with the poet.—Such brief criticism as could be here passed upon his works would be superfluous, almost impertinent. By the voice of the whole civilized world his name is “the first in all literature;” in imagination, in fancy, in knowledge of man, in wisdom, in wit, in humor, in pathos, in strength, in versatility, in felicity of language, in the music of his verse, and in that mysterious power which fuses all these separate powers into one, and makes them a single means to a single end, he stands unapproached, and seemingly unapproachable. According to the custom of his time, his dramas were founded upon others, the subjects of which were favorites with the public, or upon popular tales, or passages in history. But in the interweaving of two stories into one plot (as in “The Merchant of Venice”), and in the elaboration of a bald and barren subject, he exhibited a constructive faculty not inferior to his other gifts. He did not hesitate to avail himself of the very language of the chronicler or novelist to whom he went for incidents; but in passing through his mind it was transformed from perishable prose into imperishable poetry. His chief excellence is in the unity and consistent action of his characters. He gave each one an individual soul; they speak their own thoughts and feelings, not his. In this respect his power seems almost supernatural.—Unlike Dante, unlike Milton, unlike Goethe, unlike the great poets and tragedians of Greece and Rome, Shakespeare left no trace upon the political or even the social life of his era. Among his contemporaries and countrymen were Raleigh, Sidney, Spenser, Bacon, Coke, Camden, Cecil, Hooker, Drake, and Inigo Jones; and yet there is no evidence, even traditional, that he had any acquaintance with either of these men, or with any others of less note among the statesmen, scholars, soldiers, or artists of his day. In making his will Shakespeare left his wife (who survived him seven years), by an interlined bequest, only his “second best bed with the furniture.” This looks like a slight; but his wife was amply provided for by her dower right, and the knowledge of this might very probably cause him to pass over her at first unnamed. Yet in a will containing so many small bequests, the interlineation of a wife’s name cannot but be regarded as evidence of some lack of consideration. His family became extinct in the third generation. His son Hamnet died in 1596 at the age of 11 years. His elder daughter married a physician, Dr. John Hall, to whom she bore one daughter, who married Thomas Nash, and after his death Sir John Barnard, and died childless (1670).

His second daughter, Judith, married Thomas Quiney, and had three children, who all died without issue. Upon the death of Lady Barnard, New Place was sold. It passed again into the hands of a Sir Hugh Clopton, and finally became the property of the Rev. Francis Gastrell, who in 1759, having quarrelled with the town magistrates about assessments, razed the building to the ground, after having in 1756 cut down the mulberry tree planted by Shakespeare, because he was annoyed by the pilgrims who came to visit it. The house in Henley street has at last been purchased by an association which has had it restored as far as possible, and placed it in the hands of proper keepers.—Of Shakespeare’s 37 plays, 17 were printed separately in quartos, in almost every instance, it would appear, without his coöperation, and in many instances from copies surreptitiously obtained. The text of most of these quarto copies is very corrupt and imperfect. In 1623 two of his fellow actors, John Heminge and Henry Condell, superintended the publication of the first collected edition of his “Comedies, Histories, and Tragedies,” from which however “Pericles” was omitted. This volume, known as the first folio, contains the only authentic text of Shakespeare’s plays. But its authority is grievously impaired by the careless manner in which it was printed, and by the fact that in some cases it was put in type from the surreptitious and imperfect quartos which it was intended to supersede, and the errors of which it not infrequently perpetuates; but it corrects vastly more errors than it makes and repeats, and it supplies serious deficiencies, although it leaves some to be supplied. Plainly, too, most of the quarto copies from which it was printed had been used as stage copies by Shakespeare’s company, and thus received many corrections which were at least *quasi* authoritative. Of the text of 20 of the plays it is the only source. In 1632 a second edition of the collected plays appeared. It corrected the text of its predecessor in a few passages, corrupted it in many, and modernized it in some. It is of no authority. A third edition appeared in 1664 (some copies are dated 1663), which is chiefly noticeable from its containing “Pericles” (as to which see above), and six spurious plays attributed to Shakespeare by booksellers in his lifetime, but rejected by his friends and fellow actors: “The London Prodigal,” “Thomas Lord Cromwell,” “Sir John Oldcastle,” “The Puritan Widow,” “A Yorkshire Tragedy,” and “Locrine.” A fourth folio was published in 1685. Original copies of the folio of 1623 are eagerly sought at very high prices by Shakespearean students and collectors. They are rare, and the condition and recent history of each one is known and recorded. The last three sales (down to 1875) of fine copies were for £525, £585, and £716 respectively. But even these were not absolutely perfect according to bibliographic standard. Should a copy be found in that

condition, it would probably fetch not less than £1,000. The folio of 1623 was reprinted with a tolerable approach to accuracy in London in 1808; a very beautiful reprint, in which no errors have been detected, was put forth by Lionel Booth (London, 1862-'4); and a photo-zincographic facsimile, made under the care of Mr. Howard Staunton, appeared in 1865. The quartos have also been reissued in facsimile at various dates under the care of Mr. J. O. Halliwell; and the two remarkable quartos of "Hamlet" (1603 and 1604), in the possession of the duke of Devonshire, were reprinted together on parallel pages, as "The Devonshire Hamlets" (London, 1860), edited by Mr. Samuel Timmins. Justin Winsor, superintendent of the Boston public library, has published "Bibliography of the original Quartos and Folios of Shakespeare, with particular reference to Copies in America, with 62 Heliotype Facsimiles" (Boston, 1875).—The text of Shakespeare's works, excepting his poems, was left in so corrupt a state by the early printers, that, the author's manuscripts having perished, it needed much editorial care to bring it even into a tolerably sound condition. This subject has engaged the attention of critics and scholars for more than a century and a half, and has produced a literature in which much learning, ingenuity, and philological and even philosophical speculation are mingled with ignorance, stupidity, frivolity, and bad temper. When to the works of the editors and textual critics are added those of the philosophical and the exegetical, and the illustrators, we have a library in itself. The best index to Shakespearian literature yet published is that of Franz Thimm (12mo, London, 1865; 2d ed., 1872), which has superseded that of P. H. Sillig (8vo, Leipsic, 1854); but the former is often incorrect, and is imperfect even up to its date; while that published by J. O. Halliwell (London, 1841) is very incomplete. A nearly perfect and generally correct catalogue of Shakespeariana is to be found in Bohn's edition of Lowndes's "Bibliographer's Manual" (London, 1864); but it is badly arranged, and deformed by many important errors in names, dates, and titles. A complete and accurate critical catalogue of Shakespeariana is still a desideratum.—The editions of Shakespeare's works which, for their text or comments, are worthy of notice are: Nicholas Rowe's (7 vols. 8vo, London, 1709), the first in which the text was submitted to collation and revision; Alexander Pope's (6 vols. 4to, 1725), probably the worst ever published; Lewis Theobald's (7 vols. 8vo, 1733), in which a great advance was made in the rectification of the text; Sir Thomas Hanmer's (6 vols. 4to, Oxford, 1744); Bishop Warburton's (8 vols. 8vo, London, 1747); Dr. Johnson's (8 vols. 8vo, 1765), the value of which is in inverse proportion to the reputation of its editor; Edward Capell's (10 vols. 8vo, 1767), most laboriously and carefully edited, but with little judgment or taste;

Johnson's edition with additional notes by George Steevens (11 vols. 8vo, 1773); the same with additional notes by Isaac Reed (15 vols. 8vo, 1793); Edmund Malone's edition, a most important one (11 vols. 8vo, 1790); Isaac Reed's, an enlargement of that of 1793, with the notes and readings of various commentators, commonly called the first *variorum* (21 vols., 1813); Malone's second edition, completed and superintended after his death by James Boswell, jr. (21 vols., 1821), "the" *variorum*; Samuel Weller Singer's (10 vols. fcp. 8vo, Chiswick, 1826), an edition marked by all the traits of the critical school of the last century, but very popular from its beauty of typography and its judicious selections from the notes of previous editors. Much had thus far been done to correct and illustrate the text of Shakespeare; but it had suffered almost as much from the presumption, the perverseness, and the narrow precision of his editors and commentators, as it had profited by their laborious investigation of the literature and the manners of his time. The critical spirit of the last century was narrow and oppressed with deference to classical models. The authoritative position of the first folio was little regarded, and its readings were set aside without cause as well as with cause, at the caprice of the editor. But the minds of men had come more and more under the influence of Shakespeare's genius. It was found that he was not to be judged by the standards of the schools, but that he was a law unto himself. During the first quarter of the present century there was a growing dissatisfaction with the results of the editorial labor of the last upon the works of Shakespeare. The result was a new school of commentators and new editions of the plays. First in point of time, and most nearly absolute in deference to the first folio, was the pictorial edition of Mr. Charles Knight (8 vols. 8vo, London, 1839-'41; revised ed., 1867). This was the extreme recoil of the pendulum. It was immediately followed by the edition of Mr. John Payne Collier (8 vols. 8vo, 1841-'4). Mr. Collier worked in the spirit of an antiquary rather than a critic, and made much of readings derived from the rarest and most inaccessible quarters. He opposed conjectural emendation with a bigotry which rivalled Mr. Knight's Quixotic championship of the first folio, and often set reason at naught in favor of "the oldest authority." A judicious eclectic use was made of the labors of Mr. Knight and Mr. Collier by Gulian C. Verplanck, who prepared an edition (3 vols. 8vo, New York, 1847), to which he contributed a large amount of original matter distinguished for soundness of judgment and elegance of taste. An edition published under the direction of the Rev. H. N. Hudson (11 vols. 12mo, Boston, 1850-'57) is noticeable chiefly for the true appreciation, subtle thought, and manly vigorous style of the essays introductory to each play. In 1853 Mr. J. O. Halliwell began the publication of a stu-

pendous edition, in 20 vols. folio, which was intended to present all of interest that has been discovered or written for the illustration of Shakespeare down to the present day. This great undertaking was several years in attaining a completion which fell somewhat short of the editor's expectations. Mr. Halliwell has not done much for the correction of the text; and the same is true of Mr. Howard Staunton's pictorial edition, in which much of Mr. Knight's matter has been used. One of the most judicious editions ever published is that of the Rev. Alexander Dyce (6 vols. 8vo, London, 1850-58), of which a second edition (9 vols. 8vo, 1864-7) and a third (1875) have appeared, the last being posthumous, and each showing many and noticeable changes from the text of its predecessor. The edition of Mrs. Mary Cowden Clarke (2 vols. 8vo, New York, 1860) gives the text very carefully and judiciously. In his revisions Mr. Dyce availed himself largely of the next edition of the poet's works, prepared from a new recension and collation of the text, that of Mr. R. Grant White (12 vols. crown 8vo, Boston, 1857-62), which seeks to present the reader with all that is necessary to a critical study of the poet, and which is distinguished by its numerous and successful restorations of corrupted passages. The last complete edition of importance is that of Cambridge, edited by W. G. Clark and W. Aldis Wright (9 vols. 8vo, London and Cambridge, 1863-6), which gives all the readings of all the folios and all the quartos, and of all the editors, and the suggestions and conjectures of all the commentators whose labors are generally deemed worthy of consideration. In 1871 Mr. Horace Howard Furness began the publication of a great variorum edition, intended to include everything essential or even important as to its subject. The plays which have appeared, "Romeo and Juliet" and "Macbeth," have been received with marked approval by Shakespearian scholars.—Of the books written upon Shakespeare's life, text, and genius, forming a mass of which a very imperfect record of the mere titles fills 89 octavo pages in Sillig's book, mentioned above, only a few of the most noteworthy can be indicated here. "A short View of Tragedy; its original Excellency, and Corruption, with some Reflections on Shakespeare and other Practitioners for the Stage," by Thomas Rymer (8vo, London, 1693), is noticeable only as being the first book on this subject. But Dryden in his "Essay of Dramatic Poesy" (1668), and in the prefaces to "The Tempest" (1670) and "Troilus and Cressida" (1679), and the defence of the epilogue to "The Conquest of Granada" (1672), and Langbaine in his "Account of the English Dramatic Poets" (1691), had previously criticised Shakespeare's plays, the former very elaborately. Of subsequent critical works these are worthy of particular remark: "Shakespeare Restored, or Specimens of Blunders committed and unamended in Pope's Edi-

tion of this Poet," by Lewis Theobald (4to, London, 1726); "Miscellaneous Observations on the Tragedy of Macbeth, with Remarks on Sir T[homas] H[anmer's] Edition of Shakespeare; to which is affixed Proposals for a new Edition of Shakespeare with a Specimen," by Samuel Johnson (12mo, London, 1745); "Critical Observations on Shakespeare," by John Upton (8vo, London, 1746 and 1748); "The Canons of Criticism," by Thomas Edwards (London, 1748, and, with additions, 1765); "A Revisal of Shakespeare's Text," by Benjamin Heath (8vo, London, 1765); "Twenty of the Plays of Shakespeare, being the whole number printed in Quarto during his Lifetime, or before the Restoration; collated where there were different copies, and published from the originals," by George Steevens (4 vols. 8vo, London, 1766); "An Essay on the Learning of Shakespeare," by Richard Farmer, D. D. (8vo, London, 1767, and, greatly enlarged, Cambridge, 1767); "Notes and Various Readings of Shakespeare," by Edward Capell (4to, London, 1775, and, with important additions and "The School of Shakespeare," 3 vols. 4to, 1783); "Six Old Plays on which Shakespeare founded 'Measure for Measure,' 'Comedy of Errors,' 'Taming the Shrew,' 'King John,' 'King Henry IV.,' 'King Henry V.,' and 'King Lear,'" (2 vols. 12mo, London, 1779); "Comments on the Last Edition of Shakespeare's Plays," by John Monck Mason (8vo, Dublin, 1785); "A Dissertation on the Three Parts of Henry VI.," by Edmond Malone (London, 1792); "A Specimen of a Commentary on Shakespeare, containing: 1st, Notes on 'As You Like It;' 2dly, An Attempt to explain and illustrate various Passages on a new Principle of Criticism derived from Mr. Locke's Doctrine of the Association of Ideas," by Walter White (8vo, London, 1794); "An Apology for the Believers in the Shakespeare Papers which were exhibited in Norfolk Street, London," by George Chalmers (8vo, London, 1797), and "A Supplemental Apology for the Believers in the Shakespeare Papers" (1799; these volumes, with "An Appendix" published in 1800, in spite of the speciality of their titles, are filled with general comment and the results of careful investigation); "Illustrations of Shakespeare and of Ancient Manners," &c., by Francis Douce (2 vols. 8vo, London, 1807); "Characters of Shakespeare's Plays," by William Hazlitt (London, 1817); *Vorlesungen über dramatische Kunst und Literatur*, by August Wilhelm von Schlegel (3 vols. 8vo, Heidelberg, 1817; translated by J. Black, London, 1818); "Shakespeare and his Times," by Nathan Drake, M. D. (2 vols. 4to, London, 1817); "A Glossary, or a Collection of Words, Phrases, Names, and Allusions to Customs, Proverbs, &c., which have been thought to require Illustration in the Works of English Authors, particularly Shakespeare and his Contemporaries," by Archdeacon Narès (4to, London, 1822; and

edited by J. O. Halliwell and Thomas Wright, 2 vols. 8vo, 1859), a learned and accurate work; *Shakespeare's Vorschule*, edited, and accompanied with prefaces, by Ludwig Tieck (2 vols. 8vo, Leipsic, 1823 and 1829); "New Facts regarding the life of Shakespeare," by J. P. Collier (8vo, London, 1835); "New Particulars regarding the Works of Shakespeare," by the same (8vo, London, 1836); "On the Sonnets of Shakespeare, identifying the Persons to whom they are addressed, and elucidating several points in the Poet's History," by James Boaden (8vo, London, 1837); *Ueber Shakespeare's dramatische Kunst und sein Verhältniss zu Calderon und Goethe*, by H. Ulrici (8vo, Halle, 1839; translated, 8vo, London, 1846); "Shakespeare's Library, a Collection of the Stories, Novels, and Tales used by Shakespeare as the Foundation of his Plays," edited by J. P. Collier (8vo, London, 1840-'41; new and enlarged ed., by W. Carew Hazlitt, 1875); "Remarks on Mr. J. P. Collier's and Mr. Charles Knight's Editions of Shakespeare," by the Rev. Alexander Dyce (8vo, London, 1844); G. G. Gervinus, *Shakspeare* (4 vols., Leipsic, 1849-'50); *Shakspeare et son temps, étude littéraire*, by Guizot (8vo, Paris, 1852); "The English of Shakespeare," by George L. Craik (12mo, London, 1857); "A Critical Examination of the Text of Shakespeare," by William Sidney Walker (3 vols. 16mo, London, 1860). Mrs. Mary Cowden Clarke's "Complete Concordance" or verbal index to the dramatic works of Shakespeare, the product of almost incredible labor and patience, appeared in 1846, and is an invaluable aid to the critical study of the poet. The multitudinous publications of the Shakespeare society of London contain, among much that is either trivial or mere antiquarian rubbish, many volumes of valuable and well edited reprints of scarce old plays, of dramatic history, and of critical suggestions for the improvement of the text of Shakespeare. The "New Shakespeare Society" was established at London in 1874, under the directorship and chiefly by the exertions of the distinguished English scholar Frederick J. Furnivall. Its purposes and its publications thus far are more critical than those of the elder and extinct society.—Eminent among the philosophical critics of Shakespeare is Samuel Taylor Coleridge, who by his lectures and by his essays (see his "Friend" and his "Literary Remains") did more perhaps than any other one writer to bring about a profound and thoughtful appreciation of the poet's works. Mrs. Jameson's "Characteristics of Women, Moral, Poetical, and Historical" (2 vols. 8vo, London, 1832), as a minute and sympathetic analysis of Shakespeare's principal female characters, must ever rank high in this department of literature. The Rev. H. N. Hudson's "Lectures on Shakespeare" (2 vols. 12mo, New York, 1848) are remarkable for the same qualities, which appear in a higher degree in the essays in his edition of the works above no-

ticed. Those essays he has embodied with other kindred matter in "Shakespeare, his Life, Art, and Characters" (2 vols. 12mo, Boston, 1872). Mr. R. Grant White, in "Shakespeare's Scholar" (8vo, New York, 1854), published historical and critical studies of the poet's text, characters, and commentators, and an examination of Mr. Collier's folio of 1632, the conclusions of which were sustained by discoveries made in England five years afterward. The same writer, in his "Essay on the Authorship of the three Parts of King Henry the Sixth" (8vo, Cambridge, 1859, privately printed), has, by the general consent of Shakespearean scholars, settled that interesting and long mooted question "so far as criticism can do it." This essay was afterward embodied in its author's edition of the poet's works.—In 1852 Mr. J. P. Collier, who had previously brought forward many documents of ancient date in relation to Shakespeare, announced that he had become the possessor of a copy of the second folio edition of Shakespeare's plays (1632), which from the first page to the last contained "notes and emendations in a hand not much later than the time when it went to press." He published a history of his acquaintance with this volume, and detailed accounts, accompanied with comment, of its most plausible marginal changes in the text: "Notes and Emendations to the Text of Shakespeare's Plays, from early Manuscript Corrections in a copy of the Folio, 1632, in the Possession of J. Payne Collier, F. S. A." The sensation caused by this publication was widespread and profound. The majority of readers hailed it almost as a revelation from the tomb of Shakespeare himself; and it seemed for the moment as if all previous editions of his works had become waste paper. A small minority doubted and wondered, and a few stoutly protested. The critics on the one hand supported it enthusiastically, and on the other attacked it vigorously. It was found that the greater part of its corrections had been anticipated by the conjectural emendations of editors and verbal critics; and of the comparatively small remainder, there were very few which commanded the general assent of English scholars and students of Shakespeare. It was shown first in a paper in "Putnam's Magazine" (New York) for October, 1853, by R. Grant White, that the corrections, upon their own evidence, were made at so late a date as to have no authority from their antiquity. The folio having been placed for a time in the British museum, certain officers of that institution, including the eminent paleographer Sir Francis Madden, superintendent of the manuscript department, pronounced its marginal corrections spurious imitations of ancient handwriting, and announced that they had discovered partially erased guides in pencil, in modern handwriting, for the antique-seeming words in ink, and that in many instances the modern pencil writing appeared under that in

ink, which professed to be more than 200 years old. Upon this announcement, in July, 1859, in the London "Times," a fierce discussion arose, which continued for more than two years. It had for its subject not only the notorious folio, but all the manuscripts which Mr. Collier had brought to the notice of the public as containing contemporary notices of Shakespeare or his works, nearly all of which were pronounced forgeries by the same high authorities which condemned the folio. So extensive and so important a literary fraud had never before been detected. Toward the end of the last century a scapegrace named William Ireland professed to have discovered miscellaneous papers and legal instruments under the hand and seal of William Shakespeare, which were outrageous forgeries; but they were palpably spurious, and were quickly exposed, although they deceived many men of erudition for a time. The result of the examination and discussion in Mr. Collier's case has been to leave him with a damaged reputation both for judgment and veracity, his folio without a semblance of authority, and his manuscripts under the gravest suspicion, at the very least; although his accusers have not succeeded in making out all their case. Most of the corrections in this folio seem to have been made about 1675; but there is evidence which goes strongly to show that Mr. Collier is responsible for some of them. See "An Inquiry into the Genuineness of the Manuscript Corrections in Mr. J. Payne Collier's Annotated Shakespeare Folio, 1632, and of certain Shakespearian Documents likewise published by Mr. Collier," by N. E. S. A. Hamilton (4to, London, 1860); Mr. Collier's "Reply" to this volume (London, 1860); "A Complete View of the Shakespeare Controversy," &c., by C. Mansfield Ingleby, LL. D., with numerous facsimiles (8vo, London, 1861); and a thorough examination of the whole subject in "The Shakespeare Mystery," an article by R. Grant White in the "Atlantic Monthly" (Boston) for September, 1861.—Books upon themes directly or indirectly connected with Shakespeare multiply so fast that a complete list of them must be sought in the professed catalogues of Shakespeariana; but among the more recent the following deserve special mention: "A Letter on Shakespeare's Authorship of the 'Two Noble Kinsmen,'" by W. Spalding (8vo, Edinburgh, 1833); "Shakespeare's Puck and his Folk Lore," by William Bell (3 vols. 16mo, London, 1852-'64); "Remarks on the Differences of Shakespeare's Versification in Different Periods of his Life," by C. Bathurst (8vo, London, 1857); "A New Exegesis of Shakespeare and Interpretation of his Plays on the Principle of Races," (8vo, Edinburgh, 1859); "On the Received Text of Shakespeare's Dramatic Writings," by Samuel Bailey (2 vols. 8vo, London, 1862-'6); "Shakespeare no Deer Stealer," by C. Holte Bracebridge (8vo, London, 1862); "A Key to Shakespeare's

Sonnets," by C. Barnstoff, translated from the German by T. J. Graham (8vo, London, 1862); "Shakespeare's Home at New Place," by J. C. M. Bellevue (8vo, London, 1863); "Shakespeare Commentaries," by G. G. Gerwinus, translated from the German by F. E. Bunnett (2 vols. 8vo, London, 1863; 2d ed., with a valuable introduction on the study of Shakespeare by F. J. Furnivall, 1 vol., 1875); "An Historical Account of New Place," by J. O. Halliwell (privately printed, fol., London, 1864); Shakespeare jest books (under various titles), edited by W. Carew Hazlitt (3 vols. 16mo, London, 1864); "On Shakespeare's Knowledge and Use of the Bible," by Charles Wordsworth (8vo, London, 1864); "Shakespeare's Editors and Commentators," by W. R. Arrowsmith (8vo, London, 1865); "Shakespeare in Germany," by Albert Cohn (4to, London, 1865); "Notices of the Drama, . . . chiefly in the 16th and 17th Centuries," by William Kelly (8vo, London, 1865); "Memoirs of the Life of William Shakespeare, with an Essay toward the Expression of his Genius," &c., by R. Grant White (8vo, Boston, 1865); "Shakespeare's Delineations of Insanity," &c., by A. O. Kellogg (16mo, London, 1866); "Shakespeare's Sonnets never before Interpreted," by Gerald Massey (8vo, London, 1866; enlarged ed. of only 100 copies, with the title "The Secret Drama of Shakespeare's Sonnets Unfolded," 1872); "On Early English Pronunciation, with especial reference to Shakespeare and Chaucer," by Alexander J. Ellis (3 vols. 8vo, London, 1867 *et seq.*); "The Authorship of Shakespeare," by Nathaniel Holmes (12mo, New York, 1867); "The Mad Folk of Shakespeare," by John Charles Bucknill (12mo, London, 1867); "The Shakespeare Expositor, an Aid to the perfect Understanding of Shakespeare's Plays," by Thomas Keightly (16mo, London, 1867); "An Introduction to the Philosophy of Shakespeare's Sonnets," by Richard Simpson (16mo, London, 1868); "A Shakespearian Grammar," by E. A. Abbott (16mo, London, 1869; 2d ed., 1871); "Genealogica Shakespeariana," by George Russel French (8vo, London and Cambridge, 1869); "On the Authorship of Works attributed to Shakespeare," by C. Mansfield Ingleby (8vo, London, 1869); "Notes and Conjectural Emendations," &c., by P. A. Daniel (8vo, London, 1870); "The Sonnets of Shakespeare Solved," by Henry Brown (8vo, London, 1870); "Index to the Pages of William Sidney Walker," by Mrs. Horace Howard Furness (50 copies privately printed, 16mo, Philadelphia, 1870); "The Method of Shakespeare as an Artist," by Henry J. Ruggles (16mo, New York, 1870); "Shakespeare and Topography," by William Blades (8vo, London, 1872); "New Readings in Shakespeare," by Robert Cartwright (8vo, London, 1873); "Caliban, the Missing Link," by Daniel Wilson (8vo, London, 1873); "Body and Mind, an Inquiry into their Connection and mutual Influence, specially in reference

to Mental Disorders," by Henry Maudsley, including a profound essay on Hamlet (12mo, London, 1873); "Essays on Shakespeare," by Karl Elze, translated from the German by L. D. Schmitz (8vo, London, 1874); "Jottings on the Text of Hamlet, first Folio *versus* Cambridge Edition," by Hiram Corson, (8vo, Ithaca, 1874); "A Concordance to Shakespeare's Poems," by Mrs. H. H. Furness (8vo, Philadelphia, 1874); "Shakespeare's Centurie of Prayse," by C. M. Ingleby (8vo, London, 1874); "An Essay on the Authorship of . . . Henry VI.," by George L. Rives, a Cambridge university (England) prize essay, but founded on, and chiefly an abridgment of, Mr. Grant White's essay on the same subject (8vo, Cambridge, 1874); "Shakespeare Lexicon, a Complete Dictionary of all the English Words and Phrases," &c., by Alexander Schmidt (2 vols. 8vo, Berlin, 1874-5); and "Shakespeare, a Critical Study of his Mind and Art," by Edward Dowden (8vo, London, 1875). The Germans have taken a lively interest in this discussion; and indeed Shakespeare for 75 years has been almost as assiduously studied in Germany as in Great Britain and America. But there is no sufficient ground for the assertion that the Germans taught the English race to understand him. The best German thought of the day upon this subject is gathered in the *Jahrbuch der Deutschen Shakespeare-Gesellschaft*, edited by F. Bodenstedt and F. Leo (Berlin, 1865 *et seq.*). Shakespeare's works have been translated into all the languages of the civilized world, but best into German. The version of Schlegel and Tieck, which has been often reprinted, is probably the most perfect transfusion of thought from one form into another that ever was accomplished. A German version has recently been produced jointly by Bodenstedt, Freiligrath, Paul Heyse, Herwegh, and others (38 vols., Leipsic, 1868-'72). No adequate French translation has yet appeared. Three of importance have been made: the first by Le Tourneur (1776-'82), in which the poet's thought is often ludicrously perverted; the next by Francisque Michel (1839-'40); and the third by François Victor Hugo (1859-'65). Of these, the second is the most faithful and scholarly.—Shakespeare's name is found in the manuscripts of his period spelled with all varieties of letters and arrangement of letters which express its sound or a semblance of it; but he himself, and his friend Ben Jonson, when they printed the name, spelled it Shakespeare. In this form, too, it is found in almost every book of their time in which it appeared. Therefore, although he sometimes wrote it Shakspeare, there seems to be no good reason for deviating from the orthography to which he gave a sort of formal recognition. The spelling Shakspeare was long prevalent.

SHALE (Ger. *schälen*, to peel, to split), a rock composed of clayey sediments consolidated in layers which are fissile like the original clay,

but not often divisible into smooth sheets like the argillaceous slates. Beds of shale are common throughout the range of the secondary rocks, and constitute a large portion of some of the formations. They alternate with the sandstone and other strata of these formations, and in the coal measures are abundant in beds blackened by the carbonaceous matters intermixed with the clayey sediments. In the red sandstone groups they are commonly also red from oxide of iron, and in other formations they are olive, and sometimes green and variegated. They are soft and earthy, and are easily worn down into a muddy powder. By intermixture of carbonate of lime they become calcareous, and as the proportion of this increases they pass from calcareous shale to argillaceous limestone. Sand renders them arenaceous, and with excess of it they become sandstones. Carbonaceous matter renders them bituminous, and when the proportion is large the material is used for some of the purposes of coal. Shales of this character yield oil. (See COAL, and PETROLEUM.)

SHAMANISM, in a wide sense, all spirit worship connected with magic arts, but commonly only that of the north Asiatic races. The name is a corruption of the Sanskrit *gramana*, a Buddhist ascetic or mendicant. Shamanism is one of the earliest phases of religious life, and is met in various forms among all the savage races of the world. It is akin to or a mixture of fetichism, or the adoration of magic stones and trees, and other material objects considered as abodes of spirits, and sabaism, or the worship of the stars. Shamanic priests affect to know the secret of controlling the coming and departing of evil spirits. Their offices are generally called into requisition in cases of sickness or death, which most rude peoples ascribe to the presence or ill will of demons. In Siberia the priest usually sucks the part of the body of the patient which aches the most, and finally takes out of his mouth either a thorn, a bug, a stone, or some other object, which he exhibits as the cause of the complaint. The process is sometimes accompanied with beating of drums and blowing of horns, while the priest works himself into a state of trance and epilepsy. Similar practices are recorded in the Vedic literature of the Hindoos, and the historical extension of shamanism among the tribes of northern Asia runs parallel with the spread of Buddhism. It appears also that some of the ancient religious schisms among the Iranians were due to the prevalence of shamanism. Until the reign of Genghis Khan the Mongols were almost wholly given to similar magic and sorcery; but subsequently many of them passed over to lamaism, which is in a measure also a kind of shamanism, but infused with Buddhistic doctrines.

SHAMOKIN, a borough of Northumberland co., Pennsylvania, on Shamokin creek and the Northern Central and Philadelphia and Read-

ing railroads, 95 m. N. W. of Philadelphia; pop. in 1870, 4,320; in 1875, estimated by local authorities at 7,500. It contains many brick buildings, is lighted with gas, and is supplied with water by the Shamokin water company from a distance of about 4 m. It is situated in the middle coal field, and its principal business is the mining of anthracite coal. The product of the Shamokin region in 1874 was about 1,250,000 tons. The borough contains three founderies and machine shops, three banks, four public school houses with 21 departments and about 1,400 pupils, two private schools with about 150 pupils, two weekly newspapers, and ten churches.

SHAMROCK. See **OXALIS**.

SHAMYL (SAMUEL), a chieftain of the Caucasus, born at Aul Himry, in northern Daghestan, about 1797, died in Medina, Arabia, in March, 1871. In his youth he embraced the doctrines of Kasi-Mollah, an energetic mysticism founded on Sufism. Several tribes of Daghestan united in 1823, under the leadership of Kasi-Mollah, in a religious war against the northern infidels. In 1834, on the death of Hamsad Bey, the successor of Kasi-Mollah, Shamyl was chosen head of the sect. Having organized a sort of theocracy among the eastern Caucasian mountaineers, he began a warfare against Russia. In 1837 he defeated Gen. Ivelitch. At the storming of Akulgo by Gen. Grabbe in 1839 Shamyl was supposed to have perished, but he soon after suddenly reappeared. In 1844, after having foiled another Russian campaign, he completed the organization of his government, uniting numerous tribes hitherto hostile, made Dargo his capital, and established a code of laws and a system of taxation and internal communication. In 1845, Czar Nicholas having renewed the war, Shamyl was able to bring a large army into the field. After 1852, however, he lost to some extent the confidence of the mountaineers, and his attempts to bring the neighboring tribes into his confederation failed. The growth of religious indifference and political dissensions had begun to undermine his power, and he was able to take but little part in the Crimean war. After the peace of Paris, Russia attempted again the subjection of the Caucasus. Shamyl held out bravely for three years, but, weakened by the successive defection of many tribes, and discouraged by the

death of his eldest son, he was at last overpowered and taken prisoner at the siege of the mountain fort of Ghunib, Sept. 6, 1859. He was treated with respect by Alexander II., and after a short stay in St. Petersburg was assigned a residence at Kaluga, receiving a pension of 10,000 rubles. From here he removed in December, 1868, to Kiev, and in January, 1870, went to Mecca. (See **CAUCASUS**.)

SHANGHAI, or **Shanghai** ("approaching the sea"), a city and seaport of China, in the province of Kiangsu, on the left bank of the Wusung river, about 12 m. above its junction with the Yangtse-kiang, in lat. 31° 10' N., lon. 121° 30' E.; pop. variously estimated from 250,000 to 320,000. It stands in a fertile plain intersected by numerous streamlets, and consists of old Shanghai, which is enclosed by a wall and moat about 3 m. in circumference, and several suburbs. The walled town, which is entered by six gates, has narrow, filthy streets, and



Custom House, Shanghai.

most of the buildings are small and mean; but some of the guild halls and tea shops are fine specimens of Chinese architecture. Of its many temples, the largest is the *Ching-hwang-mian* (city and moat temple), on a rocky island in a serpentine sheet of water. The Roman Catholics have a large cathedral and the Baptists a church within the walls, and the American and London missionary societies have large schools. The foreign suburb, which is divided into three parts, the French, British, and American concessions, is laid out like a European city, with broad, paved, well lighted streets, and handsome houses and gardens. The Anglican church, club house, and masonic temple are among the principal buildings. Back of the quay, which has a bulwark of stone and stone jetties, stand the honges of the foreign merchants. In the British concession is a race course, and lower down are ship

yards, machine shops, and dry docks. Many square-rigged vessels lie at the foreign quays, and in front of the Chinese town the river is thronged with junks lashed close together. The population of the foreign suburbs in 1873 consisted of 62,844 resident Chinese, 5,566 Chinese employed in foreign honges, 9,957 boat population and vagrants, and 2,000 foreigners; total, 80,867. The climate of Shanghai is subject to sudden changes in spring and autumn, and pulmonary and rheumatic complaints are common. The day temperature in summer is from 80° to 93°, and in winter from 45° to 60°. From June to October heavy rains fall. Shanghai has a mint, and manufactures of silk, cotton, vegetable oils and oil cake, iron ware, glass, paper, and ivory goods. It is connected by the grand canal and the Yangtse-kiang and other rivers with a large part of the empire, and is visited annually by 5,000 or 6,000 canal and river boats, and by 1,500 or 1,600 coasting junks. Its foreign trade is also very large. The number of entrances in the foreign trade in 1872 was 2,111, tonnage 1,165,967; 940 vessels were British, 741 American, 135 Chinese, 127 German, and 47 French. The total value of foreign imports was \$82,169,694; of imports of native goods, \$61,549,673. The value of the total exports of native produce was \$45,504,851; of foreign products re-exported, \$50,880,627. The principal exports are tea, silk, cotton, straw braid and hats, mats, wool, skins, oil and oil cake, drugs, porcelain, and fans; imports, opium, treasure, grain, flour, manufactured goods, and coal. The value of the exports to the United States in 1874 was \$15,868,556, of which \$13,869,522 was in tea.—Shanghai was taken by the British in June, 1842, but was given up in 1843, after the ratification of their treaty with the Chinese, when it became one of the five ports opened to foreign commerce. In September, 1853, it was captured by the Taiping rebels, who soon evacuated it. In 1860-'62 it was again threatened by them, but was protected by the British and French. Its commerce declined in 1865-'6, but it is again increasing. It is now one of the 14 Chinese treaty ports.

SHANNON, a S. E. county of Missouri, intersected by Current river; area, about 1,150 sq. m.; pop. in 1870, 2,339, nearly all white. The surface is uneven, and partly occupied by pine forests. Mines of copper and iron are worked. The chief productions in 1870 were 7,243 bushels of wheat, 104,725 of Indian corn, 7,496 of oats, 9,045 lbs. of tobacco, 3,294 of wool, 25,129 of butter, and 4,812 gallons of sorghum molasses. There were 637 horses, 657 milch cows, 1,658 other cattle, 2,549 sheep, and 6,362 swine. Capital, Eminence.

SHANNON, the largest river of Ireland, rises at the foot of Mt. Cuileagh in the N. W. part of the county Cavan, flows S. W. for a few miles to Lough Allen, thence by a circuitous but generally S. course to Lough Derg, passing through Lough Ree, and thence S. S. W. to

Limerick, below which the river, here called the Lower Shannon, flows W. S. W. through a broad estuary to the Atlantic. Its total length is about 250 m. Portions of its course are very picturesque. Its largest affluent is the Suck, which enters it from the west between Loughs Ree and Derg; others are the Boyle, Fergus, Inny, Brosna, Mulkear, and Maig. The principal towns on its banks besides Limerick are Leitrim, Carrick, Athlone, and Killaloe. The tides in the estuary of the Shannon vary between 14 and 18 ft., and vessels of 400 tons can ascend as far as Limerick; the navigation has been improved throughout the entire length at a cost of about £500,000, and parliament in 1874 appropriated £300,000 for its further improvement; and canals connect it with many parts of Ireland.

SHANNY, the name of the marine spiny-rayed fishes of the blenny family, and the genus *pholis* (Flem.). They differ from the blennies proper in having the head without crests or tentacles; the body is elongated and compressed, with large pectorals, rounded caudal, ventrals under the throat and of two rays, and a single interrupted dorsal all along the back, simple and flexible; the skin is naked; mouth small, with large lips and semicircular opening; teeth in single series, numerous, small, and pointed; there is no air bladder; the stomach is thin, without cæcal dilatation, and the intestine simple without pancreatic cæca; aperture of oviduct between anus and urinary canal, and a tuft of papillæ around the seminal opening. The European shanny (*P. lævis*, Flem.) is rarely more than 5 in. long; the colors vary much, some being mottled with reddish brown, black, and white, and others uniformly dusky; the head over the eyes is rounded, from these the profile being nearly vertical, and between them a deep groove; the irides are scarlet, and the cheeks tumid; the eyes have movements independent of each other. They are abundant on the rocky coasts of England and France, keeping on the bottom, and hiding under stones at low tide to guard against voracious fishes and long-billed birds; the food consists of small mollusks and crustaceans; they spawn in summer; they are small, swim in shoals, and are of no value as food to man. The larger specimens have the habit



European Shanny (*Pholis lævis*).

of creeping out of water, by means of the ventrals, as the tide recedes, hiding in holes of the rocks, and there remaining until the tide again rises; they have been known to live 30 hours

in a dry box, and are very soon killed by fresh water. It is a matter of considerable physiological interest to ascertain how this fish is enabled to live so long a time out of water; it has no air bladder or rudimentary lung for the aëration of the blood; it is not known to have any special arrangement of the gills or accessory sac for retaining water; the gill openings are very large, just the opposite from the case in the eels and other fishes which live long out of water, and would permit the gills to become very soon dry and improper to circulate the blood. It must be remembered that the body is soft and scaleless; cutaneous respiration is very important in batrachians, and perhaps the necessary oxygenation of the blood is effected through the skin, as in the *synbranchus* of Surinam, when the gills are not in action, under the control of the par vagum nerve; perhaps also air may be swallowed, and intestinal respiration supply the necessary oxygen, as in *cobitis*. The gill openings, though large, may be accurately shut, and the bulging cheeks may thus retain sufficient water to prevent the desiccation of the gills, assisted probably by the skin as a respiratory organ.—The radiated shanny (*P. subbifurcatus*, Storer), found rarely on the coasts of Massachusetts and New York, is about 5 in. long, reddish brown above and yellowish white below, with three dark-colored bands passing backward from the eyes; the lateral line is subbifurcated, and there are filaments on the nostrils.

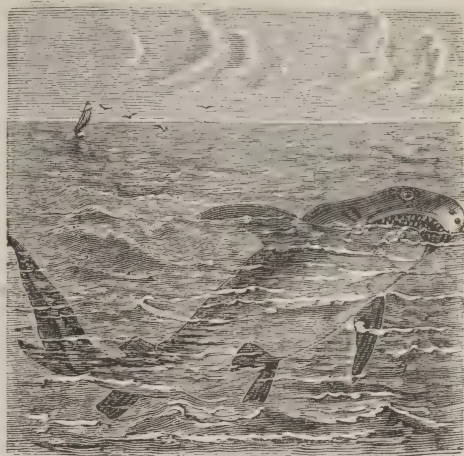
SHARJA, a seaport town of Oman, Arabia, capital of a province of the same name, on the Persian gulf, in lat. 25° 20' N., lon. 55° 36' E., 215 m. N. W. of Muscat; pop. about 25,000. It has a wall on the land side, but is open toward the harbor, which is a narrow creek running parallel with the coast, and deep enough for only small vessels. It has a large market place in the S. end, in the middle of which is the government treasury, a stone building strongly guarded. The shops are well built, and display Indian and Persian goods, and the manufactures of the place, principally red cloaks, carpets, curtains, arms, and filigree jewelry. A large part of the population are weavers, who occupy the N. quarter. Sharja is the principal port through which are imported the goods of Persia, and it is the chief place on the coast for the sale of cotton, wool, the metals, asses, and dromedaries. It has a large trade, and but for its inferior harbor it would be a place of much commercial importance. It is virtually independent.

SHARK, an extensive family of marine cartilaginous fishes, with the rays or skates and the chimæra or sea cat forming the order of plagiostomes or selachians, elevated under the latter name to a class by Agassiz. The sharks may be distinguished from the rays by their elongated fusiform body, branchial apertures on the sides of the neck, pectoral fins of the usual form and situation, and large, fleshy, and powerful tail, which is the principal organ of

locomotion; the nose is pointed and projects beyond the mouth, which is large and armed with formidable cutting teeth in several rows; the upper surface of the head often presents a pair of respiratory spiracles; the eyelids are distinct, with a free margin, and many have a nictitating membrane; the cartilaginous scapular arch is not attached to the spinal column, which contains more ossific matter than the other parts of the skeleton; the gills have their margins attached, the water escaping by five branchial openings (sometimes more); the skin is rough with osseous tubercles; the aortic bulb has several series of valves, and the shortness of the intestine is counterbalanced by an extended spiral valve. They are essentially carnivorous, and, as in the birds of prey, the females are larger and fiercer than the males; they swim with great ease and rapidity, playing around the fastest ships and steamers; they devour either living or dead animal matters, but, from the situation of the mouth on the under side of the head, are obliged to turn on the side or back to seize a large object. Many of the smaller species have received the names of dog and hound, with various canine epithets, from their habit of following their prey in packs. Sharks are higher than ordinary fishes in the phenomena of reproduction; there is with them true sexual union, and they are ovoviviparous, that is, the eggs are hatched in the oviducts, though they are often expelled before the embryo has quitted them; the egg presents in its early development many peculiarities of those of the higher vertebrates. In some the eggs are received into the villous oviduct, in which as in a uterus the young are developed; under these circumstances ova are observed in different stages of development, and frequently one in each oviduct. In others the egg is received in a horny, semi-transparent, oblong case, with long convoluted tendrils at each corner, deposited near the shore in the winter months, and moored by the tendrils; the case has an elongated fissure at each end for the entrance and exit of water; the young animal swims about for a time, deriving its nourishment from the attached yolk bag. The egg cases are often cast ashore by the waves, and are commonly known as sailors' purses. About 100 species of sharks are known, mostly in northern waters and the eastern hemisphere; some are almost cosmopolite, while others have a limited geographical distribution; the family contains the largest of the fishes, the great basking shark attaining a length of more than 30 ft.—In the family *scylliida*, generally called dog fishes to distinguish them from the sharks proper, spiracles are present; the snout is short and blunt; the gill openings are five, the last one over the base of the pectoral; two dorsals, far back and behind the ventrals; an anal present; caudal long, truncated at the end, with a notch on the under side; no caudal pit; a furrow at the corners of the mouth; teeth with a pointed median cusp, and

four or five small points on each side; the parts about the mouth and nose in some genera are divided into flaps and barbels, evidently organs of touch, necessary in their rapid passage along the bottom. They are oviparous, and the eggs resemble those of a skate. In the genus *scyllium* (Müll. and Henle) the spiracles are close behind the eyes, and the nostrils near the mouth and valved; dermal scales tricuspid. Most of the species are found around the southern coasts of Africa; they are among the smallest of the sharks, and live near the ground. There are two species on the English coast, the *S. catulus* (Cuv.) and *S. canicula* (Cuv.). The former is 2 or 3 ft. long, brownish gray above, with a few large blackish and white spots, and whitish below; the food consists of fish, mollusks, and crustaceans; it deposits about 20 eggs, according to Cuvier. The latter, the small spotted dog fish, about 2 ft. long, is more reddish, with more numerous and smaller spots; it is widely distributed, following ships and seizing whatever falls overboard; it eats chiefly fish, but has been known to attack fishermen and bathers; it lies in ambush in the mud or among weeds. Both these species are the pests of the fishing stations all along the coast, especially among the Orkney islands, robbing the lines at every opportunity, and not unfrequently caught themselves; the flesh is white, but dry and fibrous, and, though eaten by the fishermen, is rarely brought to market; in the Orkneys they are skinned, split, and dried; the skin is used by cabinet makers as a fine rasp, and the liver is valuable for its oil. Among the genera and species of N. E. Asia are many whose fins are used for soups by the Chinese. —Under the name of *squali* Cuvier comprehended all the other sharks, except the hammer-head and monk fish, of which he made distinct genera; Owen gives the name of *nectitantes* to a portion of the *squali*, chiefly *carchariadæ* and *galeidæ* (described below), the presence of a nictitating membrane to the eye being accompanied with a greater induration of the skeleton. In the family *carchariadæ* there are two dorsals and an anal, the first dorsal over the space between the pectorals and ventrals; there are no spiracles, and the last two gill openings are over the pectorals; nostrils generally small, pupil perpendicularly oval, and mouth boldly convex; the teeth are compressed, triangular, with an entire or serrated edge, arranged in a linear series like those of a saw, in several rows, of which the anterior only are erected for use; the tail has a short under lobe and a notch near the end of the upper; there is a pit above and below the base of the tail; the intestinal valve is longitudinally and not spirally rolled; skin comparatively smooth. The genus *carcharias* (Müll. and Henle) has been divided into various subgenera, but all have the nostrils midway between the mouth and end of the flattened snout, the labial cartilages very small, and the

yolk bag connected with a kind of uterine placenta in the smooth or villous oviduct. The white shark (*C. vulgaris*, Cuv.) attains a length of 30 to 35 ft., and a weight of more than 2,000 lbs.; the color is ashy brown above and whitish below; the head is large, the gape



White Shark (*Carcharias vulgaris*).

enormous, and the body stout; the teeth form such a perfect cutting apparatus, that the body of a man may be cleanly divided at a single bite; some of the jaws of this species (which are not the true jaw bones, however) are large enough, even when shrunk by drying, to slip over the body of a man; it has been seen near Calcutta to swallow a bullock's head and horns entire. This is the man-eater shark about which so many stories have been circulated, and human remains have been found in its stomach; it is gluttonous, savage, and bold; its ordinary food consists of large fish, seals, cuttle fishes, and decaying animal matters. It is found in almost all oceans, though most abundantly in tropical waters, and is a rapid and surface swimmer; it occasionally makes its appearance in the Mediterranean and on the British coasts. It is the terror of sailors, who always kill it when possible; as it follows ships to feed upon the garbage thrown overboard, and bites eagerly at any large bait dragging at the stern, it is not unfrequently caught, the precaution being taken to cut off the tail as soon as it is brought on board in order to prevent injury from its blows. The sense of hearing is very fine, if we can judge from the large size of the semicircular canals and vestibule of the ears. The young are born alive at different periods, until 20 or 30 are produced; they are 7 or 8 in. long at birth. This species meets with a formidable enemy in the sperm whale, and is often destroyed by it after a long and bloody combat; like all sharks, it is greatly infested with intestinal worms. The blue shark (*C. glaucus*, Cuv.) is a smaller species, rarely more than 8 ft. long; it is more slender and

elegantly formed, and the most beautiful in color of the sharks, being fine slate-blue above and white below; the skin is granulated and rough. It is distributed in most parts of the globe, and is very bold and voracious; its principal food consists of herring, shad, and other migratory fishes; it is a great pest to the British fishermen; when hooked, if it cannot divide the line, it rolls over and over so as to wind it around the body, sometimes beyond the power of extrication except by the knife; it also makes great havoc in the pilchard fishery, destroying the nets and devouring the fish. Like the white shark, this species is often attended by the pilot fish. (See PILOT FISH.) There are many stories of the affection of this species for its young, which are said to take refuge when alarmed in the stomach of the parent; there can be no doubt that small sharks are often found in the stomachs of the larger, but this is rather a proof of cannibalism than of parental affection. Of the American species of this genus may be mentioned the dusky shark (*C. obscurus*, Lesueur), attaining a length of 10 to 12 ft., dark brown above and dirty white below, occasionally found on the coast of the eastern and middle states; the small blue shark (*C. cæruleus*, Mitch.), 3 to 6 ft. long, slate-blue above and whitish below, found in the same waters; and Atwood's shark (*C. Atwoodi*, Storer), coming nearest the great white shark, attaining a length of 13 or 14 ft., and a weight of 1,500 lbs. The color of the last named is leaden gray above and white below; it has been caught off the coast of Massachusetts.

—In the *spinacidae*, piked dog fishes, spiracles are present; the anal fins are wanting, and the dorsals, two in number, are each preceded by a strong spine. The genus *acanthias* belongs to this family, and is described under DOG FISH.—In the family *galeidae*, topes or hounds, the fins, nostrils, gill openings, and mouth are as in the *carchariadæ*; there are very small spiracles; the teeth are alike in both jaws, with cutting edges and a cusp pointing obliquely outward; the upper lobe of the tail is much the longer and notched near the end; the scales small, three-ridged, with a median cusp. In the genus *galeus* (Cuv.) the pupil is round above and angular below; the teeth smooth on the inner edge, serrated on the outer, with the cusp smooth; the median teeth straight, jagged at the base on each side; no tail pits, and the intestinal valve spiral. The common tope or penny dog (*G. vulgaris*, Cuv.) attains a length of 6 ft.; the body is fusiform, slate-gray above and grayish white below; it is less rapacious than the blue shark, and is a pest to the fishermen in summer on the southern coasts of England; when hooked, if it cannot bite off the line, it rolls itself up in it; the young, to the number of 30 or more, are born in May and June; the liver is of some value for its oil. The genus *mustelus* (Artedi) of this family has been described under DOG FISH; in this the teeth are pavement-like as in the rays.

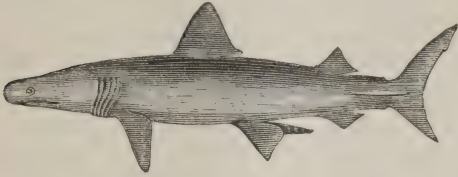
—In the family *lamnidæ* the gill openings are very large, all anterior to the pectorals; they have no nictitating membrane, and the spiracles are small, tail pits evident, caudal broadly forked and nearly crescentic, tail keeled on the sides, and the intestinal valve spiral. In the genus *lamna* (Cuv.) the snout is a three-sided pyramid with a short nasal flap, the spiracles far behind the eyes, and the mouth wide; the teeth are triangular, not serrated, with an acute toothlet at the base on each side, the surface resting on the jaw being deeply concave; there is a vacant space above and below instead of mesial teeth; skin comparatively smooth, and the scales very small. The porbeagle shark (*L. cornubica*, Cuv.), found on the northern coasts of Europe especially in autumn, attains a length of 9 ft.; it is uniform grayish black above and white below. They associate in small packs, from which and the porpoise-like form of the body the common name is derived; they feed chiefly on fishes and cephalopods; they are ovoviviparous. The mackerel shark (*L. [oxyrhina] punctata*, Mitch.) of North America is greenish on the back, lighter on the sides, and white below; the teeth are narrow, long and nail-like, calculated for holding rather than cutting prey; the head



Mackerel Shark (*Lamna punctata*).

and sides are punctured by a series of mucous pores. Like the English porbeagle, this species from its size and formidable teeth is the most dangerous of the common sharks, though it is not known to attack man unless in self-defence; it is common in summer on the New England coasts, and is a great pest to the mackerel and cod fishers; it may attain the length of 10 ft., but is usually not more than half this; it received its name from its following the shoals of mackerel on which it feeds; the liver is valuable for oil, a single fish often yielding six or seven gallons; though generally used by curriers only, when made carefully from fresh livers it is as good as whale oil to burn. The gray shark (*Odontaspis griseus*, Ag.) has the fore teeth simple, long, conical, with smooth edges and one or more basal toothlets; toward the corners the teeth are smaller and more incisorial; it attains a length of 4 to 7 ft., and is light bluish gray above, lighter on the sides, and white below; it is not uncommon in Long Island sound, and of late years in Massachusetts bay. In the genus *selachus* (Cuv.) the snout is short and blunt, and the gill openings almost meet under the throat; the teeth are very small and numerous, conical, without serrations, curving backward, and without toothlets and notches; scales

small, with radiating curved points, so that the skin feels rough; the eyes are very small. The great basking shark (*S. maximus*, Cuv.) is the largest of this class of fishes, attaining a length of 30 or 40 ft., and even over 50 ft., if the shark stranded at Stronsay in 1808, and



Great Basking Shark (*Selachus maximus*).

described as the sea serpent, belonged to this species. It descends in summer from the neighborhood of Greenland and Spitzbergen to the English channel and the middle United States. Notwithstanding its size and strength, it is the least ferocious of the sharks; it does not appear to feed on fishes, but on cuttle fishes, crustaceans, medusæ, and echini, and, according to Pennant, also on sea weeds. It is sluggish, and fond of reposing at the surface in the sun with the dorsal raised in the air, and hence called sun fish, sail fish, and basking shark; under these circumstances it is easily approached and harpooned; this is often done for the sake of the oil of the liver, which amounts to several barrels in a full-grown fish; from its speed and strength it is apt to pull a boat under water or overturn it; it has been known to drag a vessel of 70 tons against a fresh gale, and requires often 24 hours to fatigue and kill it. It is dark slate-colored above, and lighter below. The *S. elephas* (Lévesque) is probably the same species; it has been taken in the bay of Fundy 40 ft. long; on the New England coast it is called the bone shark by fishermen.—In the family *alopeciidae* the snout is short and conical, the spiracles and nostrils very small, the gill openings small, the last one over the pectorals; mouth comparatively small, the teeth not serrated, triangular, sharp, and alike in both jaws; no tooth on the mesial line, and a crescentic fold of skin behind the upper teeth; the second dorsal

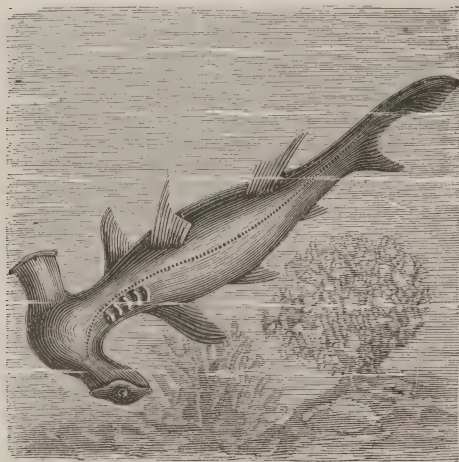


Sea Fox (*Alopias vulpes*).

opposite the anal and very small; pectorals large and triangular; upper lobe of tail as long as the body, with a pit at the root; scales small and three-pronged, and intestinal valve spiral. It contains the single genus *alopias* (Raf.), and the single species *A. vulpes* (Raf.),

the sea fox, swingle-tail, or thresher shark; it attains a length of 15 ft., but is generally much smaller than this; the body is fusiform, bluish lead-colored above, white below, with light blue blotches on the outer edge of the abdomen. It attacks its prey and enemies and defends itself by blows of the tail; the food consists principally of herring, mackerel, and other surface and shoal fish. It is found in the European seas from the Mediterranean to the coast of England, and also on the American side from the British provinces to the middle states; it has been known to attack fishing boats in the bay of Fundy.—In the family *cestraciontidae* the nostrils are slit to within the mouth, which is at the fore end of the snout; the spiracles are rather behind the eyes; the gill openings small, the last one above the pectorals; a spine forming the front of each dorsal; tail short and wide, strongly notched below; teeth pavement-like, in rounded oblique scrolls; the body short and stout, head large, and eyes prominent. The genus *cestracion* (Cuv.) furnishes the only living representative of a family numerous in the secondary geological epoch; the *C. Phillipsii* (Cuv.) is 2 or 3 ft. long, brownish above and whitish below; it inhabits the Pacific from Australia to Japan; it is called nurse in Australia, and cat or kitten shark in China; the young are often seen in Canton insect boxes.—In the family *scymnidae* the dorsals are without spines, and there is no anal nor nictitating membrane; the upper teeth are pointed, the lower broader and cutting and not denticulated; no tail pits; intestinal valve spiral. In the genus *scymnus* (Cuv.) the spiracles are far behind the eyes, the gill openings small, the body short and thick, and the lobes of the tail not very unequal. The Greenland shark (*S. borealis*, Flem.) attains a length of about 14 ft., and is ashy gray; it inhabits the arctic seas, sometimes visiting the northern shores of Europe and America. It attacks whales fiercely, and scoops out at every bite a piece as large as a man's head, the mouth being 20 to 24 in. wide. According to Scoresby, they generally attend the cutting up of whales, helping themselves freely to blubber; the men often fall into the water among them, but are not attacked; they are so tenacious of life, and so insensible to wounds, that they will return to their prey after receiving lance stabs which would kill any other shark; the muscles, especially those of the jaws, retain their irritability for several hours after death; the heart is said to be very small, and its pulsations only six or eight in a minute, which would explain their tenacity of life and the difficulty of reaching any vital organ. They also eat small fishes and crustaceans. They are liable to the attacks of a parasitic crustacean (*Lernæa elongata*, Grant), 2 or 3 in. long, which fixes itself so often to the cornea of the eyes, that it was formerly supposed to be a natural appendage; this sometimes makes them apparently blind.

The nurse or sleeper shark (*S. brevipinna*, De Kay; *somniosus*, Lesueur) attains a length of 8 ft.; the color is leaden gray, darkest on the back, with a black lateral line; the fins are so small that it must be rather slow in its movements, and it is generally regarded as a ground shark; the skin is rough and prickly; a few specimens have been caught on the coast of Massachusetts.—In the family *squatinida*, the only genus, *squatina*, has been treated under the title ANGEL FISH.—In the family *zyganida* there is a nictitating membrane, no spiracles, and two spineless dorsals; the head is flat, with the orbits extended laterally in a most extraordinary manner, flexible and doubled on themselves in the fetus, but standing out at right angles and to a greater distance as age advances; on the end of these lateral processes are the large eyes. This strange form of head is found in no other vertebrate, and only in some dipterous insects (*diopsis*, &c.), and in many decapod crustaceans whose eyes are at the end of long pedicels. The snout is truncated, so that the head resembles a double hammer; the nostrils are on the front border, and have a small nasal flap; the teeth are alike above and below, compressed pyramids, sometimes with a serrated external basal ridge, and a mesial tooth in both jaws; tail pits distinct, and oviduct villous. Such are the characters of the only genus, *zygæna* (Cuv.) or *sphyra* (Van der Hoeven), of which the best known species is the hammer-headed shark (*Z. [S.] malleus*, Cuv.); it attains a length of 12 ft. or more, and is grayish above with head nearly black, and whitish below; the iris is yellow;



Hammer-headed Shark (*Zygæna malleus*).

the first dorsal is high, triangular, falcate, and toward the upper part of the back, the second smaller and near the tail. It is found in the Mediterranean and in the warm seas of most parts of the globe, especially of the East Indies, and generally in deep water. It is so ferocious

as to attack persons bathing, and is very voracious, feeding chiefly on rays and flat fishes; great numbers of them are sometimes seen together; the flesh is leathery and unfit to eat, but the liver yields considerable oil; a female opened at Penang was found to contain over 35 living young. The common species of America, between Massachusetts and Brazil, once considered the *Z. malleus*, has been described by Dr. Storer ("Proceedings of the Boston Society of Natural History," vol. iii., 1848) as the *Z. arcuata*; it attains a length of 11 or 12 ft., and is much dreaded by fishermen.—Large sharks abounded in former geological epochs, especially during the secondary and primary periods. In some of the tertiary formations, as at Malta, teeth of sharks have been found 7 in. long and $4\frac{1}{2}$ in. wide at the base.—The principal shark fisheries are on the N. and N. W. coasts of Iceland, in Norway, and on the arctic shores of Russia W. of the White sea, where they are pursued chiefly for the oil, and on the W. coast of Hindostan in the vicinity of Bombay, where they are pursued chiefly for the fins. These are sent to China, the annual exports from Bombay amounting to £15,000 or £20,000. The fins are also collected in the Indian archipelago.

SHARON, a borough of Mercer co., Pennsylvania, on the Shenango river, here spanned by two iron bridges, and on the Erie and Pittsburgh railroad, 60 m. N. N. W. of the latter and 64 m. S. S. W. of the former city; pop. in 1870, 4,221. The Mahoning division of the Atlantic and Great Western railroad affords a direct route to Cleveland and the west. There are large coal fields in the vicinity. Iron manufacturing is the chief business, the borough containing two large rolling mills with nail factories of more than 40 machines each, two extensive foundries and machine shops, and about half a dozen blast furnaces. There are two large planing mills, several smaller manufactories, two national banks, a savings bank, and a private bank, four hotels, three large brick school houses, a masonic hall, three weekly newspapers, and nine churches.

SHARON SPRINGS, a village of Schoharie co., New York, on a branch of the Albany and Susquehanna railroad, 45 m. W. by N. of Albany; pop. in 1870, 520. It is in a narrow valley surrounded by high hills, and is a favorite summer resort. It is chiefly noted for its mineral springs, of which there are four, chalybeate, magnesia, white sulphur, and blue sulphur. These, together with a spring of pure water, are near each other and near the base of a wooded bluff W. of the village, and flow into a small stream below. The village contains several hotels, and is visited by more than 10,000 persons annually.

SHARP, Granville, an English philanthropist, born in Durham in 1734, died in London, July 6, 1813. He was the son of Dr. Thomas Sharp, archdeacon of Northumberland, author of several philological, antiquarian, and religious

works, and grandson of Dr. John Sharp, archbishop of York. He quitted the study of law for a place in the ordnance office, which he resigned at the commencement of the American war, from disapprobation of the course pursued by the government. In 1769 he befriended a negro slave named Somerset, who had been brought to England, and on falling ill had been turned into the streets by his master. When two years later the negro's master claimed him, and had him arrested and imprisoned, Sharp summoned them both before the lord mayor, who discharged the slave; but the master refusing to give him up, Sharp brought the case before the court of king's bench, the 12 judges of which, in May, 1772, decided that a slave could not be held in or transported from England. From this time Mr. Sharp devoted his powers to the overthrow of slavery and the slave trade. He wrote numerous pamphlets on the subject, and was chairman of the meeting held in London, May 22, 1787, which formed the "Association for the Abolition of Negro Slavery." He was one of the founders of the British colony of Sierra Leone, drew up a plan for its temporary government, and sent many negroes there at his own expense. He also opposed the impressment of seamen, and advocated parliamentary reform and the extension of privileges to Ireland. Besides pamphlets, he published "Representation of the Injustice and dangerous Tendency of Tolerating Slavery in England" (8vo, London, 1772); "Declaration of the People's Natural Right to a Share in the Legislature" (1774); "The Law of Retribution" (1776); "Remarks on the Uses of the Definitive Article in the Greek Testament" (1798); "Account of the Ancient Division of the English Nation into Hundreds and Tithings, and View of Frankpledge" (1784); and "Three Tracts on the Syntax and Pronunciation of the Hebrew Tongue" (1804). His biography was written by Prince Hoare (4to, London, 1810).

SHARP, James, a Scottish prelate, born in the castle of Banff in May, 1618, assassinated on Magus Muir, near St. Andrews, May 3, 1679. He was educated for the church in the university of Aberdeen, and was one of its students who in 1638 declared themselves against the "Solemn League and Covenant." In 1640 he was chosen professor of philosophy in St. Leonard's college, St. Andrews, and shortly after became minister of the parish of Crail. In 1656 he was chosen to plead for the Presbyterians before the protector; and in 1660, when Monk marched upon London, he was regularly accredited to that general as their representative, and was sent over to Charles II. at Breda to procure the establishment of presbytery. He was received very favorably by the king, and obtained the royal word "to protect and preserve the government of the church of Scotland, as it is settled by law, without violation." The next Scottish parliament however repealed all acts passed

since 1633, the church "settled by law" thus becoming the old Episcopal church; and it was asserted that Sharp was an accomplice in this scheme. While in London he had been elected professor of divinity in St. Mary's college, St. Andrews, and also appointed the king's chaplain for Scotland with a salary of £200. In December, 1661, he was consecrated archbishop of St. Andrews, an appointment which rendered him excessively odious. The wanton cruelty with which the Covenanters were persecuted was attributed to him, and it is certain that, after the rout at Pentland hills, when he had received the king's order to stop the executions, he kept it for some time private. A creature of Sharp's named Carmichael had made himself particularly obnoxious to the Presbyterians, and nine men formed a plan to waylay and murder him. While they were waiting for this person, the archbishop passed by with his daughter and a few attendants; shouting, "The Lord has delivered him into our hands," they dragged him from his coach and despatched him.

SHARP, John, an English prelate, grandfather of Granville Sharp, born in Bradford, Yorkshire, Feb. 16, 1644, died in Bath, Feb. 2, 1714. He entered Christ's college, Cambridge, in 1660, was ordained in 1667, was made archdeacon of Berkshire in 1672, prebendary of Norwich in 1675, rector of St. Bartholomew's, London, in 1676, of St. Giles-in-the-fields in 1677, and dean of Norwich in 1681. He was chaplain to Charles II., and attended as court chaplain at the coronation of James II. For a sermon in 1686 against the claim of the Roman church to be called "the only visible Catholic church," the king suspended him, but he was reinstated in 1687. In 1689 he was made dean of Canterbury, and in 1691 archbishop of York. His sermons have appeared in several editions (7 vols., 1729-'35; 5 vols., 1829).—His son **THOMAS** (1693-1758), archdeacon of Northumberland, wrote his life (edited by Dr. Newcome, 2 vols., 1825), and published works against Hutchinsonianism, on "The Rubric and Canons of the Church of England," "Antiquity of the Hebrew Tongue and Character," &c. (collected, 5 vols. 8vo, 1763).

SHARPE, a N. E. county of Arkansas, bordering on Missouri, and intersected by Spring and Strawberry rivers, tributaries of Black river; area, about 600 sq. m.; pop. in 1870, 5,400, of whom 114 were colored. The surface is a plateau, divided into a series of ridges by numerous clear streams, with much good soil. Iron, lead, and zinc occur, and the last is mined. The chief productions in 1870 were 13,443 bushels of wheat, 200,090 of Indian corn, 13,447 of oats, 56,600 lbs. of butter, and 1,046 bales of cotton. There were 1,704 horses, 2,004 milch cows, 3,376 other cattle, 4,837 sheep, and 9,581 swine. Capital, Evening Shade.

SHASTA, a N. county of California, bounded W. by the Coast mountains, and intersected by the Sacramento river; area, 4,500 sq. m.;

pop. in 1870, 4,173, of whom 574 were Chinese. The surface is greatly diversified. Lassen's peak is 10,557 ft. high. The climate of the valleys is warm in summer, but mild and equable during the rest of the year, and many of them have a fertile soil. The N. and W. portions are covered with forests of conifers, while the E. part abounds in hot and boiling springs. The county contains gold, silver, and copper. It is traversed by the Oregon division of the Central Pacific railroad. The chief productions in 1870 were 29,569 bushels of wheat, 54,636 of barley, 9,748 of potatoes, 19,287 gallons of wine, 15,820 lbs. of wool, 30,150 of butter, and 5,034 tons of hay. There were 1,473 horses, 1,207 milch cows, 2,545 other cattle, 3,520 sheep, and 11,155 swine; 2 flour mills, 7 saw mills, and 3 quartz mills. Capital, Shasta.

SHASTA, Mount. See GLACIER, ROCKY MOUNTAINS, and SISKIYOU.

SHASTRA, or Shaster. See VEDA.

SHAT-EL-ARAB. See EUPHRATES.

SHATTUCK, Aaron D. See supplement.

SHAW, Henry W. See supplement.

SHAW, Lemuel, an American jurist, born in Barnstable, Mass., Jan. 9, 1781, died in Boston, March 30, 1861. He graduated at Harvard college in 1800, became a teacher and journalist, was admitted to the bar in September, 1804, and was a representative to the state legislature from 1811 to 1815, and again in 1819. In 1820 he was a member of the convention for revising the constitution of the state. In 1821 and 1822 he was a member of the senate, and again in 1828 and 1829. The charter of the city of Boston was drafted by him. He was appointed chief justice Aug. 23, 1830, and resigned Aug. 31, 1860. His reported decisions are found in the last 16 volumes of Pickering's reports, and in those of Metcalf, Cushing, and Gray; in all, upward of 50 volumes. He received the honorary degree of LL. D. from Harvard university in 1831, and from Brown university in 1850. He was a member of the corporation of Harvard college for 27 years.

SHAWANO, a N. E. county of Wisconsin, intersected by the Oconto, Wolf, Embarras, and Red rivers; area, about 1,500 sq. m.; pop. in 1870, 3,166. The surface is generally level and the soil fertile. Lake Shawano is in the central part, and fine streams of water abound. The chief productions in 1870 were 27,272 bushels of wheat, 3,144 of rye, 7,996 of Indian corn, 27,631 of oats, 20,273 of potatoes, and 1,964 lbs. of wool. Capital, Shawano.

SHAWL, a garment worn upon the shoulders or about the waist, and formed of wool, silk, hair, or cotton. The following are the principal varieties of shawls: those of Cashmere, woven in India or imitated in Europe, with the designs either embroidered upon the fabric, or by the more costly method worked into the web in the process of weaving, thus making both sides alike; crape shawls, made of silk in imitation of the Chinese fabrics; gren-

adines, made of silk of a peculiar twist; chenilles, of silk, often combined with cotton; chiné, made with a warp printed before weaving; barege, of wool, in imitation of shawls made by the peasantry at Baréges in the Pyrenees; woollen shawls of various kinds; and tartan plaids, made for centuries in Scotland. A description of the colors of tartans worn by the different clans in 1570 is extant. Their use was prohibited by act of parliament from 1747 to 1782; and they became fashionable from about 1828, and have so continued to some extent. The printing of shawl figures is done with blocks as in calico printing, and with the same elaborateness, as many as 100 blocks and 1,600 printings or applications being sometimes necessary for the production of a single pattern. The manufacture of Cashmere shawls was introduced from India in 1784 at Norwich, England, with the imported Thibet wool, and afterward with Piedmont silk warp and fine worsted shoot, the designs being worked in by hand. In 1805 the shawls were there first completed entirely upon the loom. About the same time the manufacture was introduced in Paisley and Edinburgh, and is still continued at the former place of the Indian pattern with real Cashmere wool. In Paris the manufacture was begun in 1802, and led Jacquard to the invention of his loom. In England the principal shawl-printing establishment is at Crayford in Kent. In the United States, the business was begun at Lowell, Mass., but has since been established at several other places, and has been very greatly extended. (For statistics on the India shawl trade and other information, see CASHMERE.)

SHAWNEE, a N. E. county of Kansas, intersected by the Kansas river; area, 546 sq. m.; pop. in 1870, 13,121. It is traversed by the Atchison, Topeka, and Santa Fé, and the Kansas Pacific railroads. The surface is undulating or level, and the soil fertile. Coal and limestone abound. The chief productions in 1870 were 46,726 bushels of wheat, 602,475 of Indian corn, 60,853 of oats, 84,656 of potatoes, 238,005 lbs. of butter, and 19,122 tons of hay. There were 3,461 horses, 3,562 milch cows, 6,556 other cattle, 1,832 sheep, and 4,904 swine; 1 bookbindery, 2 flour mills, 2 saw mills, 3 manufactories of carriages and wagons, 4 of furniture, 1 of machinery, and 7 of tin, copper, and sheet-iron ware. Capital, Topeka, which is also the capital of the state.

SHAWNEES, an erratic tribe of the Algonquin family. A tradition of recent origin makes them primarily one with the Kickapoo nation; but they moved eastward, and a part are said to have remained in 1648 along the Fox river, while the main body, met south of Lake Erie by the Iroquois, were driven to the banks of the Cumberland. Some passed thence into Carolina, and others into Florida. Toward the close of the 17th century one band went north, and was among the tribes occupying Pennsylvania when it was granted to Penn,

who made treaties with them in 1682 and 1701. In 1693 and in 1722 they made treaties at Albany with the Iroquois of New York and Virginia. The portion in Florida maintained friendly relations with the Spaniards for a time, but finally joined the English in Carolina, and were known as Savannahs or Yamassees. After their war they retired to the Creeks, and finally joined the northern Shawnees. The Iroquois claimed sovereignty over the Shawnees, and drove them to the west. In 1731, rejecting the English missionaries, they negotiated with the French, and gave early aid to them in the final struggle; but in 1758 they were won over by Post, and by the appearance of Gen. Forbes. After the fall of Canada they joined Pontiac, and were active in hostilities till subdued by Bouquet. In 1774, enraged at Cresap's attack, they roused most of the western tribes, and in October defeated the Virginians at Pleasant Point, but made peace the next year. In 1779 Col. Bowman marched against the Shawnee towns, but was twice defeated. They joined in the peace of 1786, but, under English influence, took part in the Miami war, in the campaigns against Harmer and St. Clair, till they were finally reduced by Gen. Wayne, and they submitted under the treaty of Greenville (1795). The main party were at this time on the Scioto; but some had crossed into Missouri, where the Spaniards gave them land. Another band moved south. In the war of 1812 some of the bands were won by the English. Urged by Tecumseh and his brother the prophet, they endeavored to unite all the Indians of the west against the Americans, but those in Ohio remained faithful. The Missouri band ceded their lands to the government in 1825, and the Ohio band in 1831. In 1854 the band of Shawnees proper, in that part of the Indian territory now included in Kansas, numbered 900 on a reservation of 1,600,000 acres; but by treaty the tribal relation was ended and the lands were divided in severalty. Besides these, there were in 1872 90 in the Quapaw agency, and 663 in the Sac and Fox agency. The Methodists, Baptists, and Friends have all labored among this tribe.

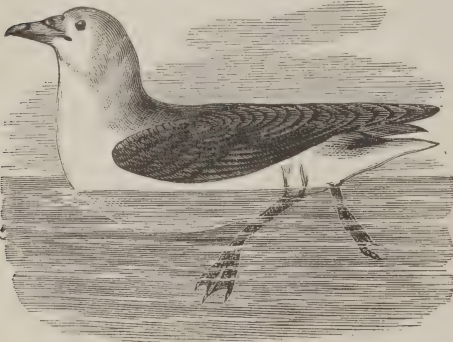
SHAYS, Daniel, leader in 1786-'7 of the rebellion in Massachusetts which bears his name, born in Hopkinton, Mass., in 1747, died in Sparta, N. Y., Sept. 29, 1825. He served as a sergeant at Bunker Hill, and became a captain during the revolution. Although not prominent in the first movements of the rebellion, Shays was chosen commander. The insurgents complained that the governor's salary was too high, the senate aristocratic, the lawyers extortionate, and taxes too burdensome to bear; and they demanded an issue of paper money and the removal of the legislature (general court) from Boston. An effort was made to allay the discontent by the passage of an act to diminish costs in the collection of debts and allow certain back taxes and debts to be paid

in produce, but the mob was not satisfied. Bodies of armed men interrupted the sessions of the courts in several counties, and in December, 1786, Shays appeared with a large force at Worcester and Springfield, and prevented the holding of the courts at those places. In January following, at the head of nearly 2,000 men, he marched to capture the arsenal at Springfield, but was opposed by the militia under Gen. Shepherd, and the insurgents were fired upon and fled, leaving three killed and one wounded on the field. Next day they were pursued by a large force under Gen. Lincoln, and at Petersham 150 were taken prisoners, the remainder dispersed, and the leaders made their escape into New Hampshire. A free pardon offered to all who would lay down their arms was generally accepted; 14 were tried and sentenced to death, but were pardoned. Shays sought safety for about a year in Vermont, and at his petition was afterward pardoned, and settled at Sparta, N. Y.

SHEA, John D. Gilmary, an American author, born in New York, July 22, 1824. He was educated at the grammar school of Columbia college, and was admitted to the bar, but devoted himself to literature. He is chiefly known for works on American history, the most important of which are: "The Discovery and Exploration of the Mississippi Valley" (New York, 1853); "History of the Catholic Missions among the Indian Tribes of the United States" (1854; German translation, Würzburg, 1856); "The Fallen Brave" (1861); "Early Voyages up and down the Mississippi" (Albany, 1862); "Novum Belgium, an Account of New Netherland in 1643-'4" (New York, 1862); "The Operations of the French Fleet under Count de Grasse" (1864); "The Lincoln Memorial" (1865); and a translation of Charlevoix's "History and General Description of New France," with extensive notes (6 vols. 8vo, 1866-'72). He is also the joint author and the translator of De Courcy's "Catholic Church in the United States" (1856). He has edited the Cramoisy series of "Relations" and documents bearing on the early history of the French American colonies (24 vols., 1857-'68); "Washington's Private Diary" (1861); Colden's "History of the Five Indian Nations," edition of 1727 (1866); Alsop's "Maryland" (1869); and a series of grammars and dictionaries of the Indian languages (15 vols. 8vo, 1860-'74). He has also published "Bibliography of American Catholic Bibles and Testaments" (1859), corrected several of the very erroneous Catholic Bibles, and revised by the Vulgate Chaloner's original Bible of 1750 (1871; 2d ed., with a translation of Allioli's commentary, 1875); and has issued several prayer books, school histories, and translations. He edited for eight years the "Historical Magazine," and has contributed largely to periodicals and publications of historical societies.

SHEARWATER, a web-footed bird of the petrel family, and genus *puffinus* (Briss.). The

bill is about as long as the head, slender, compressed near the end and grooved obliquely on the sides, with strong, curved, and acute tip; nostrils basal, with two distinct tubes, side by side; wings very long and pointed, the first quill longest; tail short and rounded; tarsi as long as middle toe and compressed; toes long and united by a full web; in some there is a straight claw in place of a hind toe. They are moderate-sized, found in both hemispheres, and are met with at sea, often many hundred miles from land, even in the most tempestuous weather, skimming and running over the waves in search of food; they are light and graceful swimmers, good divers, and pat the surface of the water with their feet like the petrels; they are rapid fliers, and can keep on the wing all day, resting on the ocean if need be at night; they breed in company, in burrows made by themselves or small mammals; they lay only one egg, and the young are covered with long down.—The greater shearwater (*P. major*, Faber) is about 20 in. long and 45 in. in alar extent; the upper plumage is brownish ash, the



Greater Shearwater (*Puffinus major*).

lower grayish white; lower back and upper tail coverts dark brown; primaries and tail brownish black, the feathers of the wings with white on the inner webs; bill yellowish green, with dark tip; tarsi and feet yellow. This species is found on the European side of the Atlantic, and ranges on the American coast from the gulf of St. Lawrence to Florida. It mingles with the fulmars, and on being approached ejects from the nostrils an oily substance; on land, where it goes only to breed, it walks as well as a duck. The food consists of fishes, crustaceans, algae, and other marine products, and floating animal substances. The Manx shearwater (*P. Anglorum*, Ray) is 15 in. long and 32 in. in alar extent; the upper plumage is black, the under white, bill brownish black, legs and feet dull orange. It is abundant on the Orkney and other northern islands, and on the American coast from New Jersey to Labrador; it breeds in rabbit burrows in the Orkneys between March and August, and all the rest of the year is at sea; the young are fat, and the natives salt and eat

them.—Some writers give the name shearwater to the genus *rhynchops*. (See SKIMMER.)

SHEATHBILL (*chionis*, Forst.), a genus placed by Gray among the gallinaceous birds, but by Latham, Cuvier, and Van der Hoeven among the waders. The bill is short, strong, compressed toward the tip, the culmen curved, and the base covered with a movable horny substance, more or less concealing the nostrils; base of bill and cheeks covered with a warty naked skin; wings moderate, the second quill the longest, and the bend with a blunt knob; tail moderate and even; tarsi short, strong, covered with small rough scales; toes moderately strong, with transverse scales, the outer united to the middle one by a membrane at the base, and the hind one small, elevated, and on one side; claws short and blunt. The white sheathbill (*C. alba*, Forst.) is from 15 to 18 in. long; the plumage is pure white, the bill and knob of wing black; the legs bare a little above the joint, and reddish. It is found in New Zealand, Australia, and the islands of the Antarctic ocean, where it frequents the shores in flocks, searching for food, which consists of mollusks, sea weeds, and animal remains; numbers have sometimes been seen by southern voyagers at a great distance from land, resting on icebergs and feeding on refuse matters. The flight is like that of the pigeon; the flesh is said to be excellent. With the general appearance of a gallinaceous bird, the sheathbill has the habits of a wader.

SHEBA, or **Saba**, in ancient geography, the capital city of the Sabæans in Arabia Felix. Its exact site is unknown. The territory of the Sabæans lay near the Red sea, and ran up to the borders of the desert. They were, partly at least, Semitic tribes, monarchically governed, the first child born in a certain number of noble families after the accession of a monarch being the presumptive heir to the throne. They held for centuries the keys of the commerce between Europe and India, and Egypt and Syria, produced and sold frankincense and aromatics, and were reputed for their opulence and luxury among the Hebrews, Greeks, and Romans. A queen of Sheba was attracted by the fame of Solomon to visit Jerusalem (1 Kings x. 1-13). The Sabæans were ultimately subjected by the Himyarites. The traveller Niebuhr was the first to assert that the country could never have produced gold, and that some of its finest spices and perfumes were probably imported.—The name of Saba was given by classical writers to other cities both on the Arabian and Ethiopian sides of the Red sea. In the Hebrew Scriptures, in contradistinction from the Arabian Sheba, the region of the Ethiopian Sabæans is called Seba.

SHEBOYGAN, an E. county of Wisconsin, bordering on Lake Michigan, drained by Sheboygan river and its tributaries, and by tributaries of Milwaukee river; area, 500 sq. m.; pop. in 1870, 31,749. It is traversed by several railroads. The chief productions in 1870 were

604,531 bushels of wheat, 93,165 of rye, 75,198 of Indian corn, 418,083 of oats, 56,767 of barley, 21,810 of buckwheat, 138,786 of potatoes, 96,984 of peas and beans, 39,351 tons of hay, 127,241 lbs. of wool, 710,010 of butter, 120,005 of cheese, 31,954 of hops, and 25,522 of maple sugar. There were 6,403 horses, 10,487 milch cows, 11,322 other cattle, 31,734 sheep, and 8,977 swine; 7 manufactories of agricultural implements, 9 of carriages and wagons, 8 of cheese, 41 of cooperage, 9 of furniture, 4 of iron castings, 1 of railroad cars, 3 of wood work, 2 of woollen goods, 10 breweries, 7 brick yards, 5 tanneries, 12 flour mills, and 12 saw mills. Capital, Sheboygan.

SHEBOYGAN, a city and the capital of Sheboygan co., Wisconsin, on Lake Michigan, at the mouth of Sheboygan river, 52 m. N. of Milwaukee; pop. in 1870, 5,310; in 1875, 6,828. It has a good harbor, and ships annually to Buffalo about 500,000 bushels of wheat. It is on the Milwaukee, Lake Shore, and Western railroad, and is the E. terminus of the Sheboygan and Fond du Lac railroad. It contains two extensive chair factories, besides 52 other manufacturing establishments of various kinds. It has one national and one private bank, a high school and other public schools, three weekly newspapers (one German), and ten churches. It was first settled in 1836.

SHECHEM, a city of ancient Palestine, called also Sichem, Sychem, and Sychar, 30 m. N. of Jerusalem, on or near the site of the modern Nablus. The allusions to it in the Old Testament are numerous. Abraham worshipped under an oak near Shechem on his first visit to the land of promise; Jacob encamped near it, and the defilement of his daughter Dinah by the son of the local chieftain led to the capture of the place and slaughter of all the male inhabitants by his sons Simeon and Levi. After the conquest of Palestine Shechem was assigned to the Levites and became a city of refuge; the bones of Joseph were buried here in the field purchased by his father from Hamor; hither Joshua assembled the tribes to hear his last counsels. After the death of Gideon, his illegitimate son Abimelech induced the Shechemites to revolt and make him their king. Three years later they expelled him, and he destroyed the city; but it was soon rebuilt, and the reign of Rehoboam was here inaugurated. Here the ten tribes renounced their allegiance to the house of David, and chose for their king Jeroboam, who made the city his capital. After the captivity Shechem became the chief seat of Samaritan worship, and remained such until its destruction by Vespasian, after which it was rebuilt and called Neapolis. (See **NABLUS**.)

SHEDD, William Greenough Thayer, an American clergyman, born in Acton, Mass., June 21, 1820. He graduated at the university of Vermont in 1839, and at Andover theological seminary in 1843, and was ordained pastor of the Congregational church in Brandon, Vt., in

1844. In 1845 he became professor of English literature in the university of Vermont, in 1852 of homiletics in Auburn theological seminary, and in 1854 of church history in the Andover theological seminary. In 1862 he was installed as associate pastor of the Brick church (Presbyterian) in New York, resigned in 1863, and became professor of Biblical literature in the Union theological seminary, and in 1874 of doctrinal theology. He has published "Outlines of a System of Rhetoric," from the German of F. Theremin (12mo, New York, 1850); "Lectures upon the Philosophy of History" (Andover, 1856); "Discourses and Essays" (Andover, 1856); "A Manual of Church History," from the German of H. E. F. Guericke (8vo, Andover and Edinburgh, 1857); "A History of the Christian Doctrine" (2 vols., New York, 1863); "Homiletics and Pastoral Theology" (1867); and "Sermons to the Natural Man" (1871). Prof. Shedd has also edited the works of Coleridge (7 vols. 12mo, New York, 1853), "The Confessions of Augustine," with an introductory essay (Andover, 1860), and the Gospel of Mark in vol. ii. of the translation of Lange's commentary; and has contributed an introduction to Asbury's translation of Ackermann's work on the Christian element in Plato, and to the American edition of McCosh's "Intuitions of the Mind."

SHEE, Sir Martin Archer, an English painter, born in Dublin, Dec. 23, 1770, died in Brighton, Aug. 19, 1850. He studied painting in Dublin under F. R. West, and at the age of 16 was a successful portrait painter. In 1788 he went to London, and became a pupil in the royal academy, to the exhibition of which he contributed his first pictures in 1789. In 1798 he was chosen an associate, and in 1800 a member of the royal academy, and in 1830 he became president and was knighted. Shortly before his death he was granted a pension of £200, with succession to his daughters. He published two parts of a poem entitled "Rhymes on Art" (1805, 1809); "The Commemoration of Sir Joshua Reynolds, and other Poems" (1814); "Alasco," a tragedy (1824); "Oldcourt," a novel (1829); and "Outline of a Plan for the National Encouragement of Historical Painting" (1837). His life has been written by his son (2 vols., London, 1860).

SHEEAHS. See **SHIAHS**.

SHEEP, a hollow-horned, wool-bearing, ruminating animal, of the genus *ovis* (Linn.). The genus is characterized by horns common to both sexes in the wild state (though sometimes wanting in the females), large, angular, transversely wrinkled, yellowish brown, curved backward, laterally, and spirally, the tip coming forward, and with a porous bony axis; arched forehead, distinct lachrymal sinus, and hairy muzzle; absence of inguinal pores and of beard under the chin; two mammae, small ears, slender legs, and short tail; and hair of two kinds, one woolly, the other exterior, closer, and harsher. In a domesticated state the wool

predominates over the hair, the horns vary or disappear, the ears and tail lengthen, and other characters undergo great modifications. Though the sheep is externally sufficiently distinct from the goat (*capra*) in general appearance, covering, and horns, the generic differences are not so evident when the whole series of these animals is examined; they run into each other so closely that some naturalists have included them in a single genus. The sheep differs from the goat chiefly in the form of the horns, absence of beard, and presence of an opening on the anterior part of each foot between the hoofs, whence issues a sebaceous secretion; the males are not so odorous as in the goat. Sheep are gregarious, timid, defenceless, and more dependent on man's care than the goat; they inhabit the mountainous regions of temperate climates, and climb rocks and precipices with facility and speed. Some naturalists count four or five distinct species, one of which is found native in each continent; there are few parts of the globe except the polar regions where some breed of the sheep is not found; they thrive remarkably in temperate Australia, producing fine fleeces; in the tropics the wool degenerates into hair. In the skeleton the parietal bone is in the form of a flattened band, encircling the cranium between the orbital wings of the sphenoid, and is narrower than in the goats; frontals large and broad; squamous portion of temporals small, and the tympanic bullæ large, terminating anteriorly by a sharp styloid process; nasals long and convex, forming a single V-shaped bone; ascending portion of intermaxillaries at a very oblique angle, and the incisive openings very large and elongated; infraorbital opening on a line with the second premaxillary; lachrymals large, articulating with the nasals; malar bones broad, thick, and much prolonged on the cheek; palate bones largely developed, deeply notched posteriorly. According to Cuvier there are 46 vertebrae, of which 7 are cervical, 13 dorsal, 6 lumbar, 4 sacral, and 16 caudal. The intestinal canal is very long and simple, the small intestines very much convoluted, and the large of nearly the same size, the whole 28 times as long as the body; the stomach compound; hepatic duct enormously large; brain elongated, narrowed in front; organ of smell highly developed. (For other anatomical details, see RUMINANTIA.) The dental formula is: incisors $\frac{2}{2}$, canines none, molars $\frac{3}{3}$; they begin to change their teeth in the first year, and have all their permanent teeth at three years, except the outer two incisors; the last, according to Owen, in the lower jaw, represent canines, as shown by the analogy of the camels, their lateness of development and peculiarity of form; this holds true in all the *cavicornia* or hollow-horned ruminants.—Sheep formed the principal wealth of the Hebrew patriarchs, and the term *pecus* (cattle) of the Latins, whence was derived *pecunia*, wealth, was applied especially to them;

they came into N. and W. Europe long after the goat, and there is no evidence of their crossing the Rhine or upper Danube until about the time of the fall of the Roman empire, though they then existed in S. Europe. In old times they were bred chiefly for their skins and milk, the last being abundant, agreeable, and highly nutritious. Now they are valued most for their wool, flesh, and fat; their flocks well managed carry fertility wherever they go, the droppings being richer than any other manure except that of fowls; they are even employed as beasts of burden in the mountains of India; the skins with the wool on are used in some countries for garments, and in the form of leather for gloves, book covers, and for various other purposes; the wool has the property of felting on account of the imbricated scaly surface of the fibres.—The Corsican musimon or moufflon (*O. musimon*, Pall.), placed by Bonaparte in the genus *capra* on account of the absence of interdigital glandular openings, and the type of the genus *caprovius* from its resemblance to a goat, grows as large as a small fallow deer, and has very large horns; it inhabits the mountains of Corsica, Sardinia, the southern part of Spain, European Turkey, and the eastern Mediterranean islands, where however it is comparatively little known. The head is long, with compressed muzzle, swollen forehead, and large, erect, and sharp ears; the horns of the male are long and triangular, comprising more than half a circle, their bases occupying almost all the forehead and separated only by a small space; they grow gradually smaller to the obtuse tip, with transverse wrinkles and raised rings; the body is large and muscular, the tail with 12 vertebrae, turned down and bare on the under side; the legs long and muscular, and the hoofs short; there is an appearance of a moderate dewlap. The general color is yellowish, with a chestnut tinge, deepest on the neck; head ash-gray; muzzle, space about eyes, interior of ears, abdomen, inside of thighs, edges of tail and end of legs, white; horns ochrey brown; the under wool is ashy or rusty white, and the hair is darker and thicker in winter; the females are without horns, or have very small ones. The average size is about 4 ft. in length and 32 in. in height; there is sometimes a tuft under the chin, and other marks also indicate it to be intermediate between sheep and goats. They are seen in flocks of 100 or more, headed by an old male; they breed with the domestic races, and have been themselves domesticated.—The Asiatic argali (*O. Ammon*, Cuv.), very similar to the moufflon in general form, is large and powerful, the male standing 3 ft. high at the shoulders and weighing 200 lbs.; the horns 4 ft. in their curve, with a weight of 30 lbs. The fur is short, fulvous gray in winter, with a ferruginous or buff dorsal stripe, and a light brown anal disk; it is more rufous in summer. It inhabits the highest mountain ranges of Asia, the Caucasus, and the plains of Siberia.

ria; its flesh is much esteemed, and in Russia the skins are still used as articles of dress; it is easily domesticated, and is generally believed to be the source of some of the eastern breeds



Asiatic Argali (*Ovis Ammon*).

of sheep; the females have small horns. The African argali or bearded sheep (*O. tragelaphus*, Cuv.), the aoudad and *ammotragus* of some authors, is another species intermediate between the sheep and goats, having the interdigital glands of the former, and the absence of lachrymal sinuses of the latter; it is one fifth larger than the European sheep, with a tail about 7 in. long, ending in a pencil of hairs; the horns are small in comparison with the size of the body, and rather smooth. The color is uniform reddish yellow, with dorsal stripe and anterior part of limbs brownish; under parts and inside of limbs whitish; the anterior parts of the neck, body, and legs are furnished with hair 6 to 12 in. long. It in-



Rocky Mountain Sheep (*Ovis montana*).

habits the mountains of N. Africa, from Abyssinia to Barbary, in small flocks; it is fierce, and bravely defends itself. America has also an argali, the Rocky mountain sheep (*O. mon-*

tana, Cuv.), called big-horn from the great size of the horns; it is found in flocks of 3 to 30, from the upper Missouri and the Yellowstone river to the Rocky mountains and the high grounds on their eastern slope, as far S. as the Rio Grande, E. to the Mauvais Terres of Nebraska, and W. to the coast ranges of Washington territory, Oregon, and California; it is said to range as far N. as lat. 68°, but is not found in the hilly regions near Hudson bay. None of the domestic breeds have been traced to this, though it would no doubt cross with them; the effect of all domestication is to improve the fleece, shortening the hair and increasing the wool.—The musimon of Corsica and the Asiatic argali, though differing somewhat in the skeletons from the domesticated races, have generally been considered as their most probable origins. The domestic sheep (*ovis aries*, Linn.), from whichever of the preceding it be derived, presents a great variety of breeds, only a few of the principal of which can be noticed here; several of them have received distinct specific names. Among the African sheep is the Fezzan breed, remarkable for the long legs, pendulous ears, arched forehead, and short, curled, and crispy fleece, like a mane on the neck and whorled on the shoulders; the usual colors are black and white. Nearly allied to this is the Persian sheep, with black head and neck, and the rest of the body white; it is very docile and affectionate. From the last or the Fezzan seem to have sprung the Morocco, Congo, Guinea, and Angola breeds; H. Smith figures a variety called the Zunu or goitred breed, having a high collar of fat behind the horns and a goitre-like fatty mass on the larynx. There are several breeds of large-tailed or fat-rumped sheep in S. Africa, extending over that continent and also to Asia; the Hottentot or broad-tailed breed is below the medium size, with short and soft fleece, and two large masses of fat on each side of the lower part of the tail, which are so esteemed as a delicacy that various contrivances are used to prevent them from dragging on the ground; the fat-rumped sheep of Tartary and temperate Asia (*O. steatopyga*) has a similar growth of fat upon the croup, and long and pendulous ears; the reason of this accumulation of fat, sometimes 70 to 80 lbs., has not been satisfactorily determined.—The most important breed of sheep as regards the texture of the wool is the merino (*O. Hispanica*), in modern times brought to the greatest perfection in Spain, though its originals probably formed the flocks of the patriarchs thousands of years ago, and have been the stock of all the fine-wooled sheep. Unlike the British breeds, they have wool on the forehead and cheeks; the horns are very large and heavy, and convoluted laterally; the wool is fine, long, soft, twisted in silky spiral ringlets, and naturally so oily that the fleece looks dingy and unclean from the dust and dirt adhering to the outside, but perfectly white underneath; the form is not so sym-

metrical as in many English breeds, and there is generally a loose skin hanging from the neck. They are kept in the milder regions in winter, and are transferred to the most fa-



Merino Sheep (*Ovis Hispanica*).

vorable localities for shearing and grazing; they are most hardy in the Pyrenees. They are brought every night to a sheltered level valley, but are never housed nor under cover; four shepherds and six large dogs are sufficient for 2,000 sheep; the dogs can easily master a wolf, alone protect the flock at night, and are fed only on bread and milk. Most of these sheep have the horns removed; the legs are white or reddish; the face is in some speckled, and in others white or reddish; they are sometimes black; they are excellent travellers; they have in a remarkable degree the mellow softness under the skin which Bakewell considers an indication of a disposition to fatten in any breed; they are extremely docile. The average fleece is 4 to 5 lbs.; several million pounds are annually exported from Spain. They readily form cross breeds, called demi-merinos, which have been brought to great perfection in France, whence, as well as from Spain, they have been imported into America. Other fine-wooled varieties of the merino are the Saxon, Silesian, and Flemish breeds, the last abundant in France and the Netherlands, and generally hornless, high on the legs, and mixed with the Barbary long-legged variety. The Astrakhan or Bokharan breed has a fine spirally twisted wool, and furnishes a great portion of the lamb skins so highly valued by furriers; it is generally a mixed black and white; in the very young each lock is divided into two small twisted curls. The Caucasian breed (*O. dolichura*) is very handsome, resembling some of the Spanish and English varieties; the males are horned, the wool of the adults coarse, and the tail, which consists of 20 vertebrae, is covered with a fine wool, which drags on the ground; they are generally white; by gentle pressure on the wool by linen coverings as the lamb grows, and by pouring warm water over it daily, it is made to lie in beautiful glossy ringlets, constituting a delicate fur much esteemed for lining robes and dressing

gowns; the black is most prized. The Mysore breed of India is without horns, with pendulous ears, short tail, and very fine wool, curled in small meshes and twisted like a corkscrew.—There is no country where more attention has been paid to the improvement of the breeds of sheep, both domestic and foreign, or where more success has been attained, than Great Britain; there are very valuable British breeds suited for the rich soil, luxuriant pastures, and mild climate of southern England, the thinner soil and rich grasses of the upland counties, and the alpine herbage and cold weather of the Scottish highlands; looking to a combination of advantages, some of the English breeds take the first rank for the small farmer. The Leicester or Dishley breed is the most esteemed of the long-wooled sheep of England, and is extensively reared on the rich and lower pasture lands. It may be known by the clean head without horns, lively eyes, straight, broad, and flat back, round body, small bones, thin pelt, disposition to make fat at an early age, and a fine-grained and well flavored flesh. It was once known as the Lincolnshire breed, noted for the quantity of the wool and the coarseness of the mutton; Mr. Bakewell effected the improvement in the breed, with great profit to himself and advantage to the wool-growing interest of his country; it has extended to the south of Scotland, and a few are kept by almost every small farmer for the wool; the fleece is abundant, the flesh excellent, and the habits docile and home-loving; a valuable breed has sprung from its mixture with the black-faced and Cheviot varieties. The black-faced or heath breed extends from the N. W. parts of Yorkshire to the highlands of Scotland, especially on the W. coast; it is active, hardy, almost goat-like in its climbing habits, with a compact shape and bright, wild-looking eyes; the horns of the male are very large and convoluted; the wool is long, coarse, and shaggy, and the face and slender legs always jet-black;



Leicester Sheep.

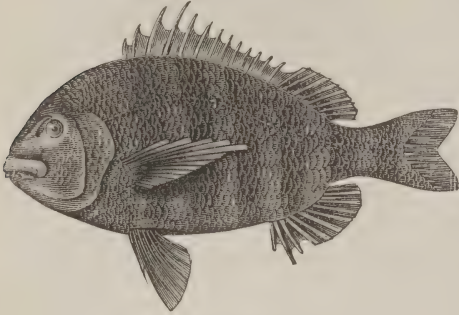
in some mixed breeds the face and legs are brownish spotted with black; the flesh is fine-grained and of excellent flavor, but the wool is comparatively unprofitable, the Cheviot, an-

other northern breed, being generally preferred as equally hardy and better fleeced. Many attempts have been made to improve it, and the Norfolk, Suffolk, and Dorset breeds are supposed to be derived from it. In the Cheviot the head is bare and clean, the face and legs white, the body long, bones small, and fleece of about 3 lbs. The Dorset is an old but handsome breed, with strong and well formed body, finely curved horns, and clear white fleece; they drop their lambs as early as September. The Southdown breed is dark-faced, without horns, with long small neck, very short and fine fleece of $2\frac{1}{2}$ to 3 lbs., and celebrated for the fine flavor of the mutton; it is in the greatest perfection in Sussex, on the chalky downs. Other British breeds without horns and with white face and legs are the Teeswater, Dartmoor, Hereford, and Romney Marsh; and with horns, the Exmoor and Spanish.—America has no indigenous domestic sheep. The first sheep were introduced into the United States at Jamestown, Va., from England in 1609, which in 40 years had increased to 3,000; they were introduced into New York and Massachusetts about 1625. Both Spanish and French merinos have been introduced, the former by David Humphreys, minister to the court of Madrid, in 1802, and the latter by Mr. Taintor, of Hartford, Conn., in 1846. They are hardy, yielding a large amount of fine wool for their size, the males 10 to 16 lbs. of washed wool, and the females 4 to 8, the former weighing from 140 to 175 lbs., the latter from 80 to 130. They thrive in summer on grass and clover, and in winter on hay, wheat bran, barley, oats, and root crops; in winter they require sheds for protection, free space, pure air, and water accessible. The best breeds are generally considered to be the Vermont Brewer and Atwood flocks; some regard the Saxon merinos as the best, and the French have less oil in their wool than the Spanish. The Leicester breed has a heavier fleece and carcass, but requires more food; as combining the advantages of wool and meat, this is the best breed for the farmer, and is excellently bred in New Jersey; the wool is long staple, and is used mostly for combing purposes, for delaines and similar cloths. The Southdowns are by many preferred to the merinos, as a third larger, hardier, and better mutton; they are very prolific, and the lambs are hardy; the wool is large in quantity and fair in quality. The Cotswold also is highly esteemed. As a general rule, the fine-wooled sheep, like the merino, Saxon, French, and Silesian, are not so profitable for the mutton as the coarse-wooled, like the Leicester, Southdown, and Cotswold; it seems impossible to combine in a single breed both these qualities in their greatest perfection. The northern and western states raise the best sheep for mutton, and the middle and southern for wool.—Sheep are remarkably affected by changes of external condition, as of climate, food, &c., and congenital varieties

thence arising may be easily perpetuated. In Massachusetts in 1791 a lamb was born with a longer body and shorter legs than the rest of the flock, with longer joints and crooked fore legs; as it could not leap over fences, it was determined to propagate its peculiarities, and from it arose the famous otter breed, now extinct; when both parents were of the otter breed, the lambs inherited the form.—Sheep are subject to many diseases, of which the most troublesome is the foot rot, from suppression of the secretion of the gland between the hoofs, and consequent inflammation, generally caused by standing on too wet ground; the best remedy is to pare the diseased hoof thoroughly and apply a solution of blue vitriol (sulphate of copper), 1 lb. to a quart of water; the animal should also be kept in a dry place. They suffer from insects, especially a bot fly (*astrus ovis*), the larvæ of which get from the lips and nostrils into the frontal and maxillary cavities, causing fatal disease; the wild sheep of elevated regions suffer least from these. They are infested with a species of tick, which may be killed after shearing by a weak solution of tobacco and water, or a preparation of oil, lampblack, and umber. Sheep are more choice in their food than goats, and yet will thrive where most other animals would starve; they prefer alpine and aromatic plants, and will soon clear a field of weeds, briars, and bushes, and by their droppings prepare it for the plough. They cannot be economically kept amid a dense population, as they would occupy too much land; and they are not profitable to pasture with cows, as they bite the grass too close for the latter to thrive upon.—For full information on the statistics and profits of sheep husbandry, see the agricultural reports of the department of the interior at Washington, and the publications of the various state agricultural societies. It need only be stated here that lambs may be weaned at from two to three months; that the female is fit for procreation at one year and the male at one and a half; that gestation lasts about five months; that one or two young are born at a time; that one male may be kept to 30 females; and that they can produce till the age of 10 or 12, and be fattened with the best advantage at 8 years.—The number of sheep in the United States, as reported by the census of 1870, was 28,477,951. The states having the largest numbers were: Ohio, 4,928,635; California, 2,768,187; New York, 2,181,578; Minnesota, 1,985,906; Pennsylvania, 1,794,301; Indiana, 1,612,680; Illinois, 1,568,286; Missouri, 1,352,001; and Wisconsin, 1,069,282. According to the report of the bureau of agriculture, the total number in the United States in January, 1874, was 34,038,200, valued at about \$89,000,000.

SHEEP'S HEAD, a spiny-rayed fish of the family *sparidae* and genus *sargus* (Cuv.); the scuppaug (*pagrus*) belongs to the same family. The gill covers are unarmed, the palate tooth-

less, the jaws not protractile, and the scales large; the front incisors are cutting, almost like those of man, and there are several rows of rounded molars. This fish (*S. ovis*, Cuv.) is about 20 in. long, though some grow considerably larger; the ground color is light



Sheep's Head (*Sargus ovis*).

gray, with six distinct, dark brown, transverse bands, broad and nearly equidistant, and another across the neck; the head is much darker, the gill covers with silvery and golden reflections, throat somewhat reddish, and irides golden; scales with dark margins; the pectorals nearly colorless, the other fins blackish brown. The body is short and thick, and the back rounded; lips large and fleshy, jaws equal, eyes large, and nostrils high on the head and double; the first 12 rays of the dorsal and first three of the anal strongly spinous, pectorals very long, ventrals stout, with spinous process at base and first ray spinous; air bladder large. The form of the head and blackness of the face give it a slight resemblance to the physiognomy of the sheep. It is caught readily in nets and seines; it is difficult to take with the hook, as the line is very liable to be cut off by the sharp incisors; its food consists of mollusks and crustaceans. Its flesh is highly esteemed. There are several allied species found on the coast from New York to New Orleans, and one in the Mediterranean.

SHEERNESS, a town of Kent, England, at the N. W. end of the island of Sheppey, on the river Medway at its junction with the Thames, 37 m. E. by S. of London; pop. in 1871, 13,956. There is here an extensive naval establishment, defended by batteries mounting 100 guns, the dockyard and buildings in connection with which occupy 60 acres, and have cost since 1815 £3,000,000. There are sometimes as many as 70 ships of war moored at Blackstakes, a little above Sheerness. The town has recently been much improved, and is becoming a favorite watering place. In the time of the commonwealth the ground on which it stands was unoccupied, and after the restoration a small fort was begun, but the Dutch destroyed it in 1667. Soon afterward strong fortifications were constructed and the dockyard was commenced.

SHEFFIELD, a town of Yorkshire, England, in the West riding, at the junction of the Sheaf and three smaller streams with the Don, 141 m. N. N. W. of London; pop. in 1871, 239,946; in 1874 reported at 261,029. The streams which unite here have their source in the surrounding high lands, and supply a large amount of effective water power. The town occupies a natural amphitheatre opening toward the northeast, and was originally confined to the angle between the Don and the Sheaf, but has extended up the slopes of the hills. The streets are well paved and lighted with gas, and the rivers are crossed by fine bridges. The original parish Church was erected in the time of Henry I., and there are several handsome modern churches. In 1872 there were 123 places of worship, of which 28 belonged to the church of England, 62 to various denominations of Methodists, 13 to the Congregationalists, 4 to the Baptists, and 4 to the Roman Catholics. The higher educational institutions are the People's college, the church of England institute, the Wesley college, the collegiate school, the old endowed grammar school, the mechanics' institution, and the government school of art, one of the best conducted in England. Its benevolent institutions are numerous and well sustained. A great music hall was opened in 1873, and a public park in 1874. The town, partly from the want of suitable drainage and partly from the unhealthfulness of some of the occupations, has a higher rate of mortality than most of the large towns of England. The river Don was made navigable to within 8 m. in 1751, and a canal subsequently prolonged the navigation to the town. The canal basin is accessible to vessels of 60 tons. Sheffield has for several centuries been renowned for its knives, and it is the chief seat of the English manufacture of cast, shear, and blister steel of all kinds, steel wire, cutlery and tools of almost every variety, railway and carriage springs and buffers, and many other kinds of steel and iron ware, as well as all classes of silver, silver-plated, electro-plated, German silver, britannia, and other white metal goods. Britannia metal and the process of silver-plating were invented here. Snuff is largely produced. There are extensive iron and brass foundries, and plates have been made for iron-clad ships. Among other important manufactures are those of optical instruments, especially spectacle glasses, and of articles in great variety from pressed horns and hoofs. The cutlers' company had its origin in the 16th century, and was incorporated by statute in the reign of James I. Its restrictions, which interfered with the prosperity of the trade, were mitigated in 1801, and wholly abolished in 1814. It is the trustee of several important charities, besides which its only duties are the granting of trade marks to cutlers.—Sheffield was a Saxon town, and received a charter as a market town from Edward I. in 1296. Early in the 15th century it

came under the control of the earls of Shrewsbury, who had a castle in the town, and a manor house in a park a mile east, in one or the other of which the greater part of the captivity of Mary, queen of Scots, was passed. The castle was demolished in 1648 by order of parliament, and the park divided into farms in 1707. The great development of the town as a centre of manufacture has made it the scene of some of the most violent demonstrations in connection with the trades unions. In 1864 the bursting of the Bradfield reservoir in the hills above it resulted in the loss of 300 lives and of property valued at about £1,000,000.

SHEFFIELD, John. See BUCKINGHAM, or BUCKINGHAMSHIRE, DUKE OF.

SHEFFORD, a S. W. county of Quebec, Canada; area, 559 sq. m.; pop. in 1871, 19,077, of whom 12,683 were of French, 3,020 of English, 2,510 of Irish, and 610 of Scotch origin. It is drained by the Yamaska river, and is traversed by the Stanstead, Shefford, and Chambly railway. Capital, Waterloo.

SHEIL, Richard Lalor, an Irish orator, born near Waterford, Aug. 17, 1791, died in Florence, May 23, 1851. He was educated at the Jesuit school of Stonyhurst, Lancashire, and at Trinity college, Dublin, where he graduated in 1811; and he was called to the bar at Lincoln's Inn in 1814. Between 1814 and 1822 he produced six dramas, "Adelaide" (1816), "The Apostate" (1817), "Bellamira" (1818), "Evadne" (1819), founded on Shirley's "Traitor," "Montoni" (1820), and "The Huguenot" (1822), all of which but the last obtained a decided success. In 1822 also appeared the first of a series of "Sketches of the Irish Bar," since collected and edited by R. S. Mackenzie (2 vols. 12mo, New York, 1854; London, 1855), which are among his most successful literary performances. About this time he began to be known in Ireland and England as a political orator and agitator, and also by his forensic efforts. He joined the Catholic association in 1822, and in 1825 was chosen with O'Connell to plead at the bar of the house of commons against its suppression. In 1829 he entered parliament, and almost immediately took his place as a most brilliant and impulsive speaker. After seconding O'Connell in the repeal agitation, he accepted a sinecure office under the Melbourne ministry, and in 1839 was made a privy councillor. He was appointed master of the mint by the Russell ministry, and in 1850 accepted the mission to Florence. His memoirs have been written by W. T. McCullagh (2 vols., London, 1855).

SHEKEL (Heb., weight), the Hebrew unit of weight, and hence, as payments were originally made by weight, also of money. It was equal to 220 grains troy, or about $\frac{1}{3}$ oz. avoirdupois, which is the weight of the earliest coin of the name known, the silver shekel of Simon Maccabæus. Its value, as differently stated, was from 50 to 62 $\frac{1}{2}$ cts. The golden shekel was of a little more than half this weight, and

worth about \$4. Both as weight and money it was divided in reckoning into the beka, reba, and gerah, respectively $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{16}$ of a shekel. The Scriptures mention the sacred and the royal shekel, which are supposed by some to be two standards of weight; the relative value was supposed by Michaelis to have been as 5 to 3.

SHELBURNE, a S. W. county of Nova Scotia, Canada, bordering on the Atlantic ocean; area, 948 sq. m.; pop. in 1871, 12,417, of whom 7,426 were of English, 1,780 of Scotch, 1,325 of Irish, and 1,064 of German origin or descent. The coast is deeply indented with numerous excellent harbors, into which flow several considerable streams. The surface is mountainous along the shore, but further inland it is mostly level. Capital, Shelburne.

SHELBURNE, William Petty, earl of. See LANS-DOWNE.

SHELBY, the name of counties in nine of the United States. **I.** A central county of Alabama, bounded E. by the Coosa river and intersected by the Cahawba; area, about 900 sq. m.; pop. in 1870, 12,218, of whom 3,378 were colored. The surface is hilly with considerable forests, and the soil is well watered and highly fertile. Coal and iron ore abound. It is traversed by the Selma, Rome, and Dalton, and the South and North Alabama railroads. The chief productions in 1870 were 30,275 bushels of wheat, 221,618 of Indian corn, 26,189 of oats, 22,358 of sweet potatoes, 2,194 bales of cotton, 3,710 lbs. of tobacco, and 6,283 of wool. There were 1,174 horses, 2,680 milch cows, 3,923 other cattle, 3,524 sheep, and 9,787 swine; 1 manufactory of cotton thread, 1 of pig and 1 of cast iron, 2 of lime, and 5 saw mills. Capital, Columbiana. **II.** An E. county of Texas, bordering on Louisiana, bounded E. by the Sabine and W. by the Attoyac river; area, 844 sq. m.; pop. in 1870, 5,732, of whom 1,755 were colored. The surface is generally level and the soil rich. The chief productions in 1870 were 168,827 bushels of Indian corn, 21,416 of sweet potatoes, and 4,090 bales of cotton. There were 1,597 horses, 3,219 milch cows, 1,058 working oxen, 7,276 other cattle, 2,173 sheep, and 13,709 swine. Capital, Shelbyville. **III.** A S. W. county of Tennessee, bordering on Mississippi, bounded W. by the Mississippi river, which separates it from Arkansas, intersected by Loosahatchee and Wolf rivers, and traversed by several railroads; area, 720 sq. m.; pop. in 1870, 76,378, of whom 36,640 were colored. The surface is level and the soil very fertile. The chief productions in 1870 were 19,025 bushels of wheat, 940,796 of Indian corn, 22,419 of Irish and 50,747 of sweet potatoes, 32,434 bales of cotton, and 1,264 lbs. of wool. There were 4,857 horses, 3,715 milch cows, 6,117 other cattle, 17,591 sheep, and 33,687 swine. There are many manufacturing establishments, chiefly in Memphis, the county seat. **IV.** A N. county of Kentucky, drained

by Beech and other large creeks; area, about 565 sq. m.; pop. in 1870, 15,733, of whom 5,383 were colored. The surface is hilly and diversified with fine forests; the soil is very rich. It is traversed by the Louisville, Cincinnati, and Lexington railroad. The chief productions in 1870 were 171,562 bushels of wheat, 62,097 of rye, 1,125,787 of Indian corn, 156,935 of oats, 240,435 lbs. of tobacco, 37,512 of wool, 229,050 of butter, and 13,497 gallons of sorghum molasses. There were 6,781 horses, 2,022 mules and asses, 4,191 milch cows, 8,980 other cattle, 9,436 sheep, and 39,852 swine; 9 manufactories of carriages and wagons, 8 of saddlery and harness, 1 flour mill, and 4 saw mills. Capital, Shelbyville. **V.** A W. county of Ohio, intersected by the Miami river; area, 425 sq. m.; pop. in 1870, 20,748. The N. part is level, the S. undulating, and the soil fertile. It is traversed by the Miami canal and the Cleveland, Columbus, Cincinnati, and Indianapolis, and the Dayton and Michigan railroads. The chief productions in 1873 were 331,293 bushels of wheat, 831,417 of Indian corn, 253,484 of oats, 37,323 of barley, 35,095 of potatoes, 11,404 tons of hay, 131,970 lbs. of tobacco, 67,709 of wool, 336,884 of butter, and 9,345 gallons of sorghum molasses. In 1874 there were 7,890 horses, 14,605 cattle, 22,461 sheep, and 25,169 hogs. In 1870 there were 2 manufactories of agricultural implements, 14 of carriages and wagons, 1 of woollen goods, 3 tanneries, 7 flour mills, and 19 saw mills. Capital, Sidney. **VI.** A S. E. county of Indiana, drained by the Blue river and numerous other streams, and traversed by several railroads; area, about 400 sq. m.; pop. in 1870, 21,892. The surface is level and the soil fertile. The chief productions in 1870 were 669,509 bushels of wheat, 1,509,448 of Indian corn, 40,227 of oats, 12,754 of barley, 8,574 tons of hay, 22,730 lbs. of tobacco, 39,494 of wool, 414,863 of butter, and 31,637 gallons of sorghum molasses. There were 7,739 horses, 5,202 milch cows, 7,928 other cattle, 14,250 sheep, and 34,918 swine; 11 manufactories of carriages and wagons, 2 of woollen goods, 1 distillery, 9 flour mills, 16 saw mills, and 1 planing mill. Capital, Shelbyville. **VII.** A central county of Illinois, intersected by the Kaskaskia and Little Wabash rivers, and traversed by several railroads; area, about 800 sq. m.; pop. in 1870, 25,476. The surface is almost level, and the soil fertile. The chief productions in 1870 were 467,541 bushels of wheat, 2,082,578 of Indian corn, 637,812 of oats, 138,314 of potatoes, 23,687 tons of hay, 6,469 lbs. of tobacco, 222,042 of wool, 368,649 of butter, and 75,183 gallons of sorghum molasses. There were 13,059 horses, 1,271 mules and asses, 7,513 milch cows, 11,204 other cattle, 62,868 sheep, and 43,411 swine; 6 manufactories of carriages and wagons, 1 of woollen goods, 2 brick yards, 9 flour mills, and 9 saw mills. Capital, Shelbyville. **VIII.** A W. county of Iowa, drained by Boyer and other rivers;

area, about 625 sq. m.; pop. in 1870, 2,540. The surface is rolling and the soil fertile. A portion of the county is traversed by the Chicago, Rock Island, and Pacific railroad. The chief productions in 1870 were 155,320 bushels of Indian corn, 25,594 of oats, 6,492 tons of hay, 11,103 lbs. of wool, 61,834 of butter, and 3,002 gallons of sorghum molasses. There were 1,199 horses, 1,151 milch cows, 1,516 other cattle, 2,806 sheep, and 2,060 swine. Capital, Harlan. **IX.** A N. E. county of Missouri, intersected by the North fork of Salt river and the South Fabius river, and by the Hannibal and St. Joseph railroad; area, about 520 sq. m.; pop. in 1870, 10,119, of whom 571 were colored. The surface is moderately hilly and the soil good. Bituminous coal and limestone are abundant, and timber is scarce. The chief productions in 1870 were 41,258 bushels of wheat, 297,982 of Indian corn, 161,559 of oats, 18,715 tons of hay, 36,596 lbs. of wool, 146,905 of butter, and 9,413 gallons of sorghum molasses. There were 3,741 horses, 541 mules and asses, 3,504 milch cows, 7,776 other cattle, 13,028 sheep, and 14,223 swine. Capital, Shelbyville.

SHELBY, Isaac, an American officer, born near Hagerstown, Md., Dec. 11, 1750, died in Lincoln co., Ky., July 18, 1826. He removed to the west in 1771, and in 1774 served as a lieutenant in an expedition against the Indians. When the revolution broke out he became captain of a military company in Virginia, and in 1777 was placed in charge of the commissary department for the frontier militia. In 1779 he was elected to the house of delegates of Virginia, and received a major's commission, and the next year was made a colonel. For his bravery at the battle of King's Mountain, Oct. 7, 1780, he received a vote of thanks and a sword from the legislature of North Carolina, of which he was elected a member in 1781 and 1782. In 1781 he served in Marion's campaign. On the organization of the state of Kentucky in 1792 he was chosen governor, and held the office four years, and again from 1812 to 1816. In 1813 he joined Gen. Harrison at the head of 4,000 Kentuckians, served at the battle of the Thames, and received a gold medal from congress.

SHELBYVILLE, a city and the county seat of Shelby co., Indiana, on the Blue river and the Indianapolis, Cincinnati, and Lafayette railroad, at the junction of a branch of the Jeffersonville, Madison, and Indianapolis line, 27 m. S. E. of Indianapolis; pop. in 1870, 2,731; in 1875, estimated by local authorities at 4,000. It is surrounded by a rich farming country, is lighted with gas, and has a good fire department. It contains a planing mill, two saw mills, three flouring and grist mills, two banks, five hotels, a seminary, three weekly newspapers, and seven churches.

SHELDRAKE, or *Shieldrake*, the common name of the river ducks of the subfamily *anatinae* and of the genera *tadorna* (Leach) and *casarka*

(Bonap.). In *tadorna* the bill is shorter than the head, higher at the base than broad, with culmen concave in the middle, depressed, curved upward at the tip, which is suddenly hooked and has a strong narrow nail; lamellæ slender and widely set; nostrils large, near the culmen; wings moderate, pointed, the second quill longest, and armed on the shoulder with a tubercle; tail moderate, nearly even; tarsi strong, shorter than the middle toe; toes short, fully webbed; hind toe elevated, slightly lobed; claws moderate and curved. They are widely distributed over the old world, on the seacoast as well as on rivers and lakes, migrating in winter from the north; they feed on marine plants and worms, crustaceans, and mollusks; the nest is made of grass lined with down, and is often placed in the deserted burrows of rabbits and other rodents; they lay 12 to 14 eggs. The common sheldrake (*T. vulpanser*, Flem.) is one of the handsomest of water fowl, the colors being brilliant and pure, and strongly contrasted. In the male the bill is vermilion; the head and upper neck green bounded by a



Common Sheldrake (*Tadorna vulpanser*).

white collar, below which is another of rich chestnut covering the upper breast and back; rest of back, rump, and upper tail coverts white; scapulars nearly black, outer webs of long tertials chestnut, point of wing and its coverts white, primaries dark brown, and speculum green; tail white, tipped with black; abdomen rich dark brown; sides, vent, and under tail coverts white; the length is 24 to 26 in.; the female is smaller and not so bright, and the young are more brownish. The windpipe is about 10 in. long, having on each side at its lower portion a hollow, globular, bony protuberance, generally much larger on one side than the other. The note is a shrill whistle; the flesh is coarse, dark, and of unpleasant odor and flavor; the eggs are shining white, 2¾ by 2 in.; incubation lasts 30 days, both sexes sitting; they are easily domesticated, and are often raised by hens. Yarrell thinks the names are derived from their favorite shell food, and from their frequent use on heraldic shields; they are also called burrow ducks from their common places of breeding, also

skeling geese in Scotland, and sly geese (from their devices for leading intruders from their nests and young) in the Orkney islands. Two other species are found in Australia.—In the genus *casarka* the bill is as long as the head, nearly straight, the width equal to the height at the base, the anterior half depressed, scarcely curved upward at tip, which has a strong and broad nail; wings moderate, the second quill the longest; tail short and rounded; tarsi robust, shorter than the middle toe; toes long, fully webbed; hind toe long, elevated, and lobed. The ruddy sheldrake (*C. rutila*, Bonap.) is about the same size as the last, with similar breeding habits; in the male the bill is lead-colored; the head, cheeks, and chin buff, becoming orange brown at the lower part of the neck all round, where there is a ring of black; the back, tertials, breast, and under parts like the head; wing coverts pale buff white; primaries and tail dark leaden gray, secondaries lighter, and speculum brilliant green; the female is rather smaller and lighter colored, with white on the throat and wings, but without the black collar. It is sometimes called collared duck, and ruddy goose; it is a native of eastern Europe and western Asia, coming as far west as England and south to Italy and Africa; it is fond of breeding in the holes of marmots in river banks, and the eggs are 8 to 10. Other species are found in Australia and New Zealand, and they all resemble geese in general form, and especially in the females having the plumage colored nearly like the males.—In America the name of sheldrake is given to the red-breasted merganser, which resembles the European sheldrake only in the color of its breast. (See MERGANSER.)

SHELL LAC. See LAC.

SHELLEY. I. Percy Bysshe, an English poet, born at Field Place, near Horsham, Sussex, Aug. 4, 1792, drowned in the bay of Spezia, July 8, 1822. His ancestors had long been large landholders in Sussex. His father, Sir Timothy Shelley, was a country gentleman, who had studied at Oxford. Bysshe was sent in his sixth year to a day school near home, and in his tenth to a seminary at Brentford, where he excelled in his studies. At the age of 13 he went to Eton, where he refused to fag, and consequently was harshly treated by his schoolfellows, till he alarmed them by his storms of anger or won their love by his kindness. He was already in love with Miss Grove, a cousin of his own age, with whom he wrote a romance entitled "Zastrozzi" (London, 1810), with the payment for which he gave a magnificent banquet to his friends. He wrote another romance, "St. Irvyne, or the Rosicrucian" (London, 1811), translated a portion of Pliny's "Natural History," and composed in conjunction with Capt. Medwin the poem of "Ahasuerus, or the Wandering Jew," a portion of which was afterward published; but his greatest passion was for chemistry, and he continued eagerly to experiment with elec-

tricity and acids after his return home in 1809. In 1810 he went to Oxford, and became an undergraduate of University college. At first devoted to physics, he abandoned them for metaphysics. Hume and the French exponents of Locke were his text books, and he soon rushed to materialism and atheism. At the age of 17, says De Quincey, satisfied that atheism was the sheet anchor of the world, he determined to accomplish a general apostasy successively in the university, the church of England, and the whole Christian world. He began with printing a pamphlet of two pages on the "Necessity of Atheism," setting forth the defective logic of the usual arguments for the divine existence. He sent it with a letter to the heads of colleges and professors of the university, inviting them to notify him of their assent to the accompanying argument; for this he was expelled, and ordered to quit the college by the next morning. His father at first forbade his appearance at Field Place. All communication was forbidden between him and Miss Grove, who soon married another. He took lodgings in Poland street, London, and his sisters, who were at school at Brompton, sent him small sums saved from their pocket money, the bearer being their school-mate Harriet Westbrook, a beautiful daughter of a retired hotel-keeper, residing in London; and after his reconciliation with his father, who settled upon him an allowance of £200 a year, he suddenly eloped with her and married her at Greta Green. He was aged 19, and she 16. The young pair went to Edinburgh, thence to York, and at length fixed their residence at Keswick. There Shelley became intimate with Southey and De Quincey, and received many favors from the duke of Norfolk. He had already obtained the friendship of Leigh Hunt, and proposed to him a scheme for forming an association of liberals; and he began a correspondence with Godwin, whose advice probably saved him from extreme imprudence in the championship of Irish wrongs, when soon after he removed to Dublin. There, in February, 1812, he published a pamphlet entitled "An Address to the Irish People," copies of which he threw from his window and distributed to passers on the street. The police suggested to him the propriety of quitting Ireland, and he resided successively in the isle of Man, in North Wales, and in Plymouth. From the last named place he addressed an eloquent letter to Lord Ellenborough against his sentence on the publisher of the third part of Paine's "Age of Reason." Soon afterward he took a cottage in Tanyrallt, Carnarvonshire; and prior to May, 1813, he had visited London, resided again in Dublin, made a tour to the lakes of Killarney, and returned to London. In Tanyrallt, as elsewhere, he visited and relieved the poor and suffering. A mysterious attempt on his life, which was never explained, occasioned his immediate removal. In London was born his daughter,

Ianthe Eliza. He soon after removed to the cottage of High Elms in Berkshire, where he passed the summer, with the exception of visits to London and Field Place. Toward the close of 1813 the estrangement which had been slowly growing between him and his wife resulted in their separation by mutual consent, and she returned to her father's house, where she gave birth to a second child, which died in 1826. He was soon after travelling abroad, chiefly in Switzerland, with Mary, afterward the second Mrs. Shelley, daughter of William Godwin and Mary Wollstonecraft, all of whom deemed marriage a useless institution. His father, succeeding to the family estates, settled on him from this time an allowance of £1,000 a year. In the winter he frequented a hospital to acquire some knowledge of surgery, that he might become more serviceable to the poor; made several trips in England in 1815; and again visited Switzerland in 1816, where he first met Byron. The same year his wife drowned herself. He now married his second wife, who had been his companion for two years, and fixed his residence in the neighborhood of Marlow in Buckinghamshire. He claimed the custody of his children, which was refused by the court of chancery on the ground of the alleged depravity of his religious and moral opinions, and after this decision he again left England. He had become acquainted with Keats, whose genius he defended against the reviewers, and afterward wrote to his memory the dirge of "Adonais." In 1810 he had published at Oxford "Posthumous Fragments of Margaret Nicholson," a small volume of poems; and in September of that year, in London, "Original Poetry, by Victor and Cazire," of which about 100 copies got into circulation before he suppressed it, but none can now be found. He had commenced at the age of 18, and completed in 1812, a poem in the rhythm of Southey's "Thalaba," entitled "Queen Mab." It was printed privately in 1813, and an edition was surreptitiously issued in 1821, when he was in Italy. He applied to chancery for an injunction to restrain the sale, which was refused on the ground that the law could give no protection to a heretical book, nor even recognize it except by prosecution. In 1815 he wrote at Bishopsgate, on the Thames, his poem of "Alastor, or the Spirit of Solitude." At Marlow he wrote "The Revolt of Islam." There he suffered a severe attack of ophthalmia, caught while visiting the cottages of the poor. In 1818 he left England, never to return. At Lucca he completed the poem of "Julian and Maddalo," a dialogue between himself and Lord Byron, and began his "Prometheus Unbound," which was finished in Rome in 1819 (London, 1821). His next production was "The Cenci," a tragedy repulsive in its subject, but the most elaborate in execution of all his writings. In 1819 he wrote "The Witch of Atlas" in three days after a pedestrian excursion, and in 1821 produced his

"Epipsychidion," "Adonais," and "Hellas." Among his minor poems, the most exquisite and original are the "Address to the Skylark," "The Sensitive Plant," and "The Cloud." He had renewed his intimacy with Byron in Italy, and enjoyed boating as his favorite amusement. On July 8, 1822, he sailed with his friend Williams, in a boat of peculiar build, and requiring skilful management, from Leghorn for Lerici. In a sudden squall the boat disappeared, and the bodies of Shelley and his companions were washed ashore. The quarantine regulations of Tuscany required that everything drifting from the sea should be burned, and the remains of the poet were therefore reduced to ashes on a funeral pile, after the ancient fashion, in the presence of Lord Byron, Leigh Hunt, and Mr. Trelawney. The ashes were deposited in the Protestant burial ground at Rome, near the grave of Keats, with the inscription: *Cor Cordium*. His reputation both as a poet and a man has risen as the misapprehensions of his contemporaries have passed away, and his sincerity, benevolence, noble aims, and peculiar graces of character and genius have been fully recognized.—Mrs. Shelley published an edition of his poetical works, with biographical notes, in 1839, and a selection from his letters, translations, and prose writings, in 1840. The first complete edition of his works, from the original editions, was edited by R. H. Shepherd (4 vols., London, 1875). See also the "Life" by Capt. Thomas Medwin (London, 1847); "Recollections of the Last Days of Shelley and Byron," by E. J. Trelawney (London and Boston, 1858); the unfinished "Life of Shelley," by Thomas Jefferson Hogg (2 vols., London, 1858); the "Shelley Memorials," by Lady Shelley (London and Boston, 1859); and "Shelley's Early Life, from Original Sources," by Denis Florence Mac-Carthy (London, 1872). **II. Mary Wollstonecraft Godwin**, an English authoress, second wife of the preceding, born in London in 1797, died there, Feb. 1, 1851. She was the daughter of William Godwin and Mary Wollstonecraft, received a careful and peculiar education, and married Shelley in 1816, after having lived with him two years previous to his first wife's death. In 1816, on the lake of Geneva, she joined in a compact with Shelley and Byron each to write a romance in imitation of the German ghost stories which they were reading. The result was her novel of "Frankenstein" (London, 1818), the hero of which discovers the secret of generation and life, and creates a man by the resources of natural philosophy, who proves to be a powerful and mischievous monster. She completed the novel of "Valperga" just before the death of Shelley, and afterward published "The Last Man," "Lodore" (1835), and "The Fortunes of Perkin Warbeck." She also wrote a series of biographies of foreign artists and poets for the "Cabinet Cyclopædia" (1835), and "Rambles in Germany and Italy" (1844), and edited Shelley's works (2 vols., 1839-'40).

SHELTON, Frederick William, an American author, born at Jamaica, Long Island, N. Y., about 1814. He graduated at the college of New Jersey in 1834, took orders in the Protestant Episcopal church in 1847, and has been successively settled at Huntington, Long Island, at Fishkill on the Hudson, and at Montpelier, Vt., whither he went in 1854. He now (1875) resides at Carthage Landing, Dutchess co., N. Y. He has published "The Trollopian, or Travelling Gentleman in America" (New York, 1837), a satirical poem; "Salander and the Dragon, a Romance" (1851); "Chryselline, or the Heiress of Fall-Down Castle" (1854); "The Rector of St. Bardolph's, or Superannuated," and "Up the River" (1853), a series of rural sketches; and "Peeps from the Belfry, or the Parish Sketch Book" (1855).

SHEM (Heb., name, or fame), one of the three sons of Noah, according to most commentators the eldest. He was the progenitor of the southwestern nations of Asia, being the father of Elam (Susiana), Ashur (Assyria), Arphaxad (according to Josephus, Chaldea), from whom descended the Hebrews and Arabs, Lud (Lydia), and Aram (Syria). The region occupied by the Biblical Shemites or Semites thus extended from the mountains E. of the Tigris to the western offshoots of the Taurus, and from the Armenian mountains to the southern extremities of the Arabian peninsula. (See SEMITIC RACE AND LANGUAGES.)

SHENANDOAH, a river of Virginia, the principal tributary of the Potomac. The main river, or South fork, rises in Augusta and Rockingham cos. in three streams which unite near Port Republic, Rockingham co., flows N. E. through the valley of Virginia, W. of and nearly parallel with the Blue Ridge, receives the North fork at Front Royal, Warren co., and falls into the Potomac at Harper's Ferry, W. Va. Its length from Port Republic is about 170 m., and it is navigated by small boats, called gondolas, for more than 100 m. above Front Royal. It passes through the richest portion of Virginia, and affords immense water power. The valley of the Shenandoah was very conspicuous in the military operations of the civil war.

SHENANDOAH, a N. county of Virginia, intersected by the North fork of the Shenandoah river; area, about 500 sq. m.; pop. in 1870, 14,936, of whom 676 were colored. The surface is hilly and the soil generally fertile. Iron ore, lead, copper, coal, and limestone are found. It is traversed by the Winchester, Potomac, and Harrisonburg division of the Baltimore and Ohio railroad. The chief productions in 1870 were 239,045 bushels of wheat, 19,860 of rye, 154,313 of Indian corn, 81,023 of oats, 8,329 tons of hay, 18,757 lbs. of wool, and 165,338 of butter. There were 3,466 horses, 9,946 cattle, 6,645 sheep, and 9,364 swine; 1 manufactory of bar and 1 of pig iron, 7 of stone and earthenware, 10 flour mills, and 3 saw mills. Capital, Woodstock.

SHENSTONE, William, an English poet, born at the Leasowes in Hales-Owen, Shropshire, in November, 1714, died there, Feb. 11, 1763. He passed several years at Pembroke college, Oxford, but never took a degree. About 1745 he retired to his hereditary estate of the Leasowes, which it thenceforth became the business of his life to beautify. He wrote elegies, odes, ballads, and miscellaneous pieces, but is best known by the "Schoolmistress," a poem published in 1742. Dodsley published his works and letters (3 vols. 8vo, 1764-'9). An edition of his poems, with a memoir by the Rev. George Gilfillan, appeared at Edinburgh in 1854, and a new edition of his "Essays on Men and Manners," &c., at London in 1868.

SHEPARD, Charles Upham, an American physicist, born at Little Compton, R. I., June 29, 1804. He graduated at Amherst college in 1824, taught botany and mineralogy in Boston, was for two years assistant in the laboratory of Prof. Silliman at Yale college, and took charge for one year of an institution opened in New Haven by James Brewster for popular lectures on science. In the winter of 1832-'3 Mr. Shepard, under a commission from the United States government, investigated the culture of the sugar cane and the manufacture of sugar in the southern states, and incorporated the results of his observations in Prof. Silliman's report to the secretary of the treasury in 1833. He had previously been appointed lecturer on natural history in Yale college, a post which he held till 1847. From 1834 to 1861 he was professor of chemistry in the Charleston medical college, S. C. In 1835 he was appointed associate of Dr. Percival in the state geological survey of Connecticut. In 1845 he was chosen professor of chemistry and natural history in Amherst college, where he is now (1875) professor of natural history. His collection of minerals and meteorites, now deposited in Amherst college, is the finest in the United States, and surpassed in Europe only by those of the British museum and the imperial cabinet of Vienna. He has published "Treatise on Mineralogy" (1832; 3d ed., enlarged, 1855), a report on the geology of Connecticut (1837), and numerous scientific papers.

SHERBROOKE. I. A S. county of Quebec, Canada, drained by the St. Francis and Magog rivers; area, 219 sq. m.; pop. in 1871, 8,516, of whom 3,544 were of French, 2,442 of English, 1,601 of Irish, and 777 of Scotch origin or descent. It is traversed by the Grand Trunk, the Massawippi Valley, and the St. Francis and Lake Megantic International railways. **II.** A town, capital of the county, on both sides of the river Magog, at its entrance into the St. Francis, on the Portland division of the Grand Trunk railway, at the intersection of the Massawippi Valley railway, 80 m. E. by S. of Montreal; pop. in 1871, 4,432. It contains manufactories of woollen and cotton cloths, flannels, iron castings, machinery, axes, pails, &c., several saw mills and breweries, a

bank, a branch bank, an academy, and three weekly newspapers (one French).

SHERBURNE, a central county of Minnesota, bounded S. W. by the Mississippi and intersected by Snake river; area, 445 sq. m.; pop. in 1870, 2,050. It contains several small lakes. The surface is diversified and the soil productive. It is traversed by the St. Paul and Pacific railroad. The chief productions in 1870 were 26,457 bushels of wheat, 37,006 of Indian corn, 17,797 of oats, 17,987 of potatoes, 8,303 tons of hay, 2,556 lbs. of wool, and 56,610 of butter. There were 412 horses, 716 milch cows, 1,490 other cattle, 1,112 sheep, and 542 swine. Capital, Orono.

SHERIDAN. I. An unorganized N. W. county of Kansas; area, 900 sq. m. It is drained by Prairie Dog creek, the North and South forks of Solomon river, and the Saline river. It consists of undulating and fertile prairies, and is well adapted to grazing. **II.** A N. central county of Dakota, recently formed and not included in the census of 1870; area, about 1,750 sq. m. It contains several small lakes, and the N. part is watered by one of the head streams of the Cheyenne and by an affluent of Mouse river. The W. part is occupied by the Plateau du Coteau du Missouri.

SHERIDAN, Philip Henry, an American soldier, born in Somerset, Perry co., Ohio, March 6, 1831. He graduated at West Point in 1853, served in Texas in 1854-'5, and on the Pacific coast till May 14, 1861, when he was made captain of the 13th infantry, chief quartermaster and commissary of the army of S. W. Missouri, and subsequently quartermaster to Gen. Halleck in the Mississippi campaign of the spring of 1862. On May 25, 1862, he was made colonel of the 2d Michigan volunteer cavalry, and took part in the pursuit of the confederates from Corinth, May 30 to June 10, and in the engagement at Booneville, July 1, when he was made brigadier general of volunteers. In command of the 11th division of the army of the Ohio he led the advance into Kentucky, and was in the battle of Perryville, Oct. 8, and in the subsequent march to the relief of Nashville. Assigned to the army of the Cumberland, his division was in the campaign of Tennessee from November, 1862, to September, 1863, taking active part in the battle of Murfreesboro (see MURFREESBORO), when he was made major general of volunteers. He captured a train and prisoners at Eagleville in March; crossed the Cumberland mountains and Tennessee river in August; took part in the battle of Chickamauga, Sept. 19, 20, and in the operations about Chattanooga, including the battle of Missionary ridge, Nov. 23-25; and was subsequently engaged in E. Tennessee till March, 1864. From April 4 to Aug. 3 he was in command of the cavalry corps of the army of the Potomac, and with his 10,000 men was actively employed in operations in the Wilderness, and between it and Richmond, in May, June, and July. While mainly employed

in reconnoitring and in protecting the flank of the army, his corps made several vigorous raids, cutting off railway connections and capturing or destroying stores, was more than 20 times engaged with the confederate cavalry, and took an important part in the actions in and about Cold Harbor. On Aug. 4 he was appointed to the command of the army of the Shenandoah, and on the 7th to that of the middle military division. He defeated Early on the Opequan, Sept. 19, for which he was made a brigadier general in the United States army; at Fisher's Hill, Sept. 22; and at Cedar creek, Oct. 19, where he turned a rout into a brilliant victory, for which he received the thanks of congress. On Nov. 8 he was made a major general. From Feb. 27 to March 24, 1865, he was engaged in the raid from Winchester to Petersburg, during which he destroyed the James river and Kanawha canal, cut important railway connections, destroyed military and commissary stores, and had numerous skirmishes with the enemy. From March 25 to April 9 he was in the Richmond campaign. On April 1 he gained the battle of Five Forks, which insured the abandonment by the confederates of Petersburg and Richmond (see PETERSBURG, SIEGE OF), and he led in the pursuit of Lee, and was present at his capitulation, April 9. He was appointed to the command of the military division of the Southwest June 3, and of the military division of the Gulf July 17; of the department of the Gulf Aug. 15, 1866; of the fifth military district, including Louisiana and Texas, March 11, 1867; and of the department of the Missouri, with headquarters at Fort Leavenworth, Sept. 12. On March 4, 1869, he was made lieutenant general and assigned to the command of the division of the Missouri, including the departments of Dakota, of the Missouri, of the Platte, and of Texas, with headquarters at Chicago, which office he still holds (1875). Early in 1875, political disturbances threatening in Louisiana, he was stationed for a few weeks in New Orleans, and then returned to his command in Chicago.

SHERIDAN. I. Thomas, an Irish clergyman, born in county Cavan about 1684, died in Dublin, Sept. 10, 1738. He was educated by private charity at Trinity college, Dublin, took orders, received the degree of D. D., and was named chaplain to the lord lieutenant. Losing his college fellowship by marriage, he opened a school in Dublin, which proved highly successful, but finally ruined it by negligence and extravagance. In 1725 he was presented to a living through the influence of Dean Swift, but lost his chaplaincy by preaching a sermon on the birthday of George I. from the text: "Sufficient unto the day is the evil thereof." After several changes of fortune he died in great poverty and distress, having maintained through all a gay and careless cheerfulness, not allowing a day to pass, according to Lord Cork, "without a rebus, an anagram, or a madri-

gal." He published a translation of Persius in prose, and one of Sophocles's "Philoctetes" in verse. Many of his letters are included in Swift's "Miscellanies." **II. Thomas**, an elocutionist, son of the preceding, born at Quilca, the residence of Dean Swift, near Dublin, in 1721, died at Margate, Aug. 14, 1788. He was educated at Westminster school and at Trinity college, Dublin, and in 1743 went upon the stage. In 1744 he played at Covent Garden theatre, and in 1745 at Drury Lane, and was set up as a rival of Garrick. For eight years he managed the Dublin theatre, but in 1754, disregarding a clamor for the repeated recitation of certain popular and political passages in a play, a fierce riot broke out, and he retired. He resumed the management in the next year, but the erection of a rival theatre and other causes ruined his business. He then engaged with great success in lecturing on elocution in London, Oxford, Cambridge, and Scotland. He received a pension from the crown on the accession of George III. In 1760 he appeared again briefly at Drury Lane, when his quarrel with Garrick was renewed. He subsequently appeared at the Haymarket, and his last performance was at Covent Garden in 1776. After Garrick's retirement in that year, Sheridan was for three years manager of Drury Lane, his son Richard Brinsley being lessee. He then retired altogether from the theatre, and in 1780 published his "Complete Dictionary of the English Language, both with regard to Sound and Meaning, one main Object of which is to establish a plain and permanent Standard of Pronunciation." Among his other works are: "Lectures on the Art of Reading," "Course of Lectures on Elocution," and a "Life of Swift." **III. Frances**, a novelist, wife of the preceding, born in Ireland in 1724, of English parentage, died in Blois, France, in September, 1766. At the age of 15 she wrote a romance, "Eugenia and Adelaide," which was afterward adapted for the stage by her daughter as a comic drama, and acted with success in Dublin. She became acquainted with Sheridan by means of a pamphlet which she published in his defence during his managerial troubles in Dublin, and they were soon after married. Her romances, "Sidney Biddulph" and "Nourjahad," are still admired. She was also the author of two less successful comedies, "The Discovery" and "The Dupe," and wrote, but never published, "The Trip to Bath," from which her son is supposed to have derived hints for his "Rivals." **IV. Richard Brinsley**, an English dramatist and politician, son of the preceding, born in Dublin in September, 1751, died in London, July 7, 1816. In 1762 he was sent to Harrow, whence in his 18th year he went to Bath, where his family had settled, and in conjunction with a friend named Halded wrote some fugitive pieces, and a translation of Aristænetus. He fell in love with Miss Linley, a young and beautiful singer of Bath, and to save her from the persecutions of a lib-

ertine named Matthews he fled with her early in 1772 to France, and they were secretly married at Calais. The result was two duels with Matthews, in the last of which Sheridan was wounded. In 1773 he entered the Middle Temple as a student of law, and shortly afterward was married anew by license, and retired to a cottage at East Burnham. On Jan. 17, 1775, his comedy of "The Rivals" was brought out at Covent Garden, and, though it failed the first night, speedily became the universal favorite it has ever since remained. It was followed the same year by the farce of "St. Patrick's Day, or the Scheming Lieutenant," and the comic opera of "The Duenna," which had the then unparalleled run of 75 representations during the season. In 1776, with his father-in-law and Dr. Ford, he purchased Garrick's share of Drury Lane. In the following year he brought out "The School for Scandal," which placed him at once at the head of comic dramatists. This was followed in 1779 by a monody on the death of Garrick, and the farce of "The Critic." Embracing the principles of the whig party, his first service was in connection with a periodical called "The Englishman." In 1780 he was elected a member of parliament from Stafford, and entered the ranks of the opposition to the administration of Lord North. His first speech, in reply to accusations brought against him for bribery and corruption in securing his election, disappointed both his friends and his enemies. He rarely spoke after this, and only after great preparation. In 1782 Lord North went out of office, and in the short-lived ministry of Rockingham which followed, Sheridan was one of the under-secretaries of state. After the accession of Shelburne to the treasury, he, with most of the friends of Fox, resigned. In the coalition ministry of Fox and North in 1783, Sheridan was secretary of the treasury, but retired on the accession of William Pitt. Parliament having been dissolved, he was one of the few adherents of the coalition that were reelected in 1784. On Feb. 7, 1787, Sheridan brought forward the charge against Warren Hastings touching the spoliation of the begums or princesses of Oude, in an oration which was the greatest effort of his life, but no good report of which exists. In the trial of Hastings Sheridan was one of the managers of the impeachment, and made a second oration little inferior, which lasted four days. In 1790 he was reelected to parliament from Stafford. A rupture took place between him and Burke, caused somewhat by a mutual jealousy, but ostensibly by a difference of opinion on the French revolution. In June, 1792, his wife died, and in 1795 he married a Miss Ogle, daughter of the dean of Winchester. His careless and extravagant style of living resulted in pecuniary embarrassment, and irregularities of his private life placed him under the ban of public opinion. In the house of commons he vehemently assailed the adminis-

tration, but at the time of the mutiny at the Nore lent it his support. In 1799 he brought out the play of "Pizarro," which is largely a translation from Kotzebue. Sheridan supported the short-lived ministry of Addington, and in this differed from Fox, between whom and himself a feeling of reserve and even alienation had been for some time growing. In the ministry of Grenville and Fox, which succeeded the death of Pitt, he accepted the comparatively unimportant office of treasurer of the navy. He was elected from Westminster after a severe contest; but in 1809, while speaking in the house of commons, he saw himself involved in almost total ruin by the burning of Drury Lane theatre, in rebuilding which he had already loaded himself with debt. In 1812 he failed to be reelected from Stafford, and this filled up the measure of his ruin. His health had been destroyed by drink, and his spirits were depressed by harassing duns. His books, his furniture, his presents were sold or passed into the hands of pawnbrokers; even the portrait of his first wife by Reynolds went out of his possession; and he was imprisoned two or three days for debt. While in his last illness an officer arrested him in his bed, and would have carried him to the sponging house had he not been threatened with prosecution by Sheridan's physician. He died near his sick wife, deserted by all except his medical adviser and Peter Moore, Rogers, and Lord Holland, the few friends who had remained faithful to him in his misfortunes. He was buried in the poets' corner in Westminster abbey. His life, by Thomas Moore, was published in 1825, and his "Speeches" were "edited by a Constitutional Friend" (5 vols. 8vo, London, 1816). His "Dramatic Works" form a volume of Bohn's "Standard Library" (1848), and have been edited, with a memoir, by James P. Browne, M. D. (2 vols. 8vo, 1873). A collection of Sheridan's dramas, poems, translations, speeches, and unfinished sketches, with a memoir and a collection of ana, has been edited by F. Stainforth (1874).

SHERIFF (A. S. *scyre*, shire, and *gerefa* or *refa*, keeper or steward), in Great Britain and the United States, the chief officer of a county. The office of sheriff is of ancient Saxon origin, as appears from the composition of the word, which successively assumed the forms of shyre-greve, shiregreve, shirereeve, and shireve. Cowell writes the word shireve, and Blount shirif or shiref. In the Norman period the earl or count (*comes*) was the one to whom was committed the custody of the shire or county; and when in course of time he was relieved of the active functions of the office, they were devolved upon an inferior officer, called therefore *vice-comes*, who is identical with the sheriff. Gradually the earls were discharged not only of the duties of the office but also of the commission, and the sheriffs thus came to be the immediate officers of the crown and not of the earls; and the sheriff

succeeded to almost all the authority, judicial and ministerial, that the *comes* or earl had hitherto possessed. Until the time of Edward II. the sheriff was elected by the inhabitants of the several counties; but a statute of the ninth year of that reign abolished election, and ever since, with few exceptions, the sheriff has been appointed, upon nomination by the king's councillors and the judges of certain ranks, by the approval of the crown. In some cities and towns the sheriff is elected either by the whole body of the freeholders or by some particular body of the corporation. London claims prescriptive right to elect her two sheriffs. The office of sheriff is still in England one of eminent honor, and is conferred on the wealthiest and most notable commoners in the counties.—The English sheriff, the sheriff of the common law, we may say, is the custodian of the county and the conservator of the king's peace therein. In virtue of these functions he is bound to apprehend all disturbers of the peace and bind them to good behavior or commit them for examination, and to arrest and commit all felons. To these ends he has the right to summon to his aid whenever it is necessary the *posse comitatus*, or power of the county, and he has the custody of the county jail. In a ministerial capacity it is his office to execute all writs and processes directed to him by the superior courts of judicature, to take recognizances and bail, to summon juries, and to execute final process and judgments of the courts whether civil or criminal. As king's bailiff, he is to take into his charge all lands falling to the crown under attainders or by escheats, levy all fines and forfeitures, and collect all waifs and estrays. Finally, in his judicial capacity he may adjudicate in certain petty civil suits. He also determines matters touching the election of knights of the shire, of coroners, and other officers.—The sheriff retains in the United States many of the faculties of the sheriff at common law; yet his capacity in all respects is much dependent on the provisions of special statutes. His judicial powers are particularly restricted here; his duties are in fact almost entirely ministerial. Generally in the United States the sheriff, like every other considerable officer, is elected by the whole body of the people, and holds his office for a prescribed term of years. In New York and some other states he is ineligible for the three years next succeeding his term of office. As he cannot perform in his own person the manifold duties of his office, the sheriff may appoint deputies. He is also in some states required to appoint an under sheriff. This officer is the equal of the sheriff himself, and acts in his stead in all respects when he is absent or his office is vacated. The sheriff may create as many general deputies as he thinks proper. The deputy sheriff in this country, though not in England, is an officer known and recognized by the law. He is sep-

arately sworn, and has his distinct rights and liabilities. Primarily, however, the sheriff is responsible for all the deputy's defaults in respect to duties imposed by the law upon the sheriff.—As conservator of the peace it is the duty of the sheriff (and generally speaking the deputy may do what the sheriff may do) to suppress all unlawful assemblages, to quell all riots and affrays, and to arrest and commit to jail, if need be, those engaged in the disturbance of the public order. For any breach of the peace or any crime or misdemeanor committed within his view the sheriff may make an arrest without a warrant. To suppress an affray actually going on, he may even break into a dwelling house, and so he may if he is in fresh pursuit of one who has committed an offence within his view, and there is danger that he may escape if he is not followed. When the breach of the peace has been committed at a time past, it is the sheriff's duty in most cases to provide himself with a warrant before making an arrest. In the service of this process, the sheriff appears, in a ministerial capacity, as the officer of the court which issues it. In making the arrest, the officer ought, properly speaking, to show his warrant, and make known, to a reasonable degree, the contents and purport of it; but every person within his bailiwick is bound to take notice of his official character. If the warrant is issued for the arrest of one who has committed a felony, the sheriff may even break the outer door of a house in order to execute the process. If the warrant of arrest appears upon its face to be defective in any essential respect, it is absolutely void, and all who participate in the execution of it are trespassers. The party arrested under a warrant ought to be brought presently before the court or magistrate who issued the process.—The sheriff's duties and powers in the execution of civil process differ in some respects from those imposed upon him in the execution of process in criminal matters. On the one hand, the officer is liable to the suitor at whose instance the process issues, if through negligence or error he fails to perform his whole duty in the service of it; while he is responsible to the party wronged if he exceeds the power conferred upon him. Wherever then he has reasonable grounds to doubt his authority to act in the premises, the sheriff may ask an indemnity. This is often done in cases where the title to property which is directed to be attached is doubtful, or where the officer questions the identity of a person whom he is ordered to arrest. Service of summons in a suit is made by reading it to the party to whom it is addressed, or ordinarily by delivering to him a copy of it, or by leaving the copy at his last usual place of residence. Attachment of property, as the first step in the suit, is unknown to the common law, and is founded upon statutes. To constitute a valid attachment of personal property, the officer must take actual possession of the goods. The sub-

sequent use of the property by the owner with the officer's permission, when no harm is done to the goods by the using, or even a resumption of the possession by the owner for the purpose of making a delivery subject to the officer's attachment, does not vacate this attachment. A warehouse may be broken into in order to make an attachment of goods deposited there. Goods in a store are well attached by locking the door and taking the key. Shares of stock may be attached by leaving an attested copy of the writ and of the return of the attachment with the treasurer or other clerk of the corporation at the business office. The duties of the sheriff in respect to the drawing of jurors, the service of summonses or subpoenas, and other incidents of the trial of causes, are treated elsewhere. (See **JURY**, and **SUBPOENA**.)—When judgment is docketed in a civil suit against a defendant, it is the sheriff's business to levy the execution which thereupon issues at the instance of the plaintiff. Subject in some respects to the direction of the plaintiff or his attorney, it is the officer's duty to secure the amount of the execution, or the portion of it directed to be collected. If the defendant will not upon request satisfy by payment the amount of the judgment, the sheriff proceeds to satisfy it by the seizure of any goods of the defendant which can be found within the county. The levy may be made at any time before the return day of the execution, but it is expedient to make it at once lest there be any alienation of the property. Any property supposed to belong to the defendant and found in his possession, even though he asserts that it has been sold, mortgaged, or otherwise encumbered, ought to be levied upon by the officer; for if he neglects to do so, he assumes the responsibility of showing that it was in fact exempt; and yet if he does levy and the defendant's statement was indeed true, he becomes liable as trespasser to the real owner or party holding a prior lien, and therefore he has a right to demand indemnity in any such case. In order to make a valid levy, the property ought to be present or in the view of the officer, and he should do some act to signify his claim to control it henceforth. Making a memorandum upon the execution, making an inventory of the goods, or taking a receipt for them from some responsible party, may perhaps be a sufficient indication of a levy. The sheriff may not break into a house to make a levy, but he may enter if the door is open, and remain a reasonable time. The levy in the case of real property, where the statute does not make the judgment itself a sufficient lien, is made by mere indorsement on the execution. Property taken on execution, whether real or personal, is regularly exposed by the sheriff to sale by public auction; and the sheriff can sell such property only for cash.

SHERLOCK. I. William, an English clergyman, born in Southwark about 1641, died in Hampstead, June 19, 1707. He was educated

at Eton and at Peter house, Cambridge, and became rector of the parish of St. George, Botolph lane, London, in 1669, prebend of St. Pancras in the cathedral of St. Paul's in 1681, master of the Temple in 1684, and dean of St. Paul's in 1691. He refused the oaths of allegiance to William and Mary, and was suspended from his preferment, but at length submitted and took them. The principal of his numerous works are: "Case of the Allegiance due to the Sovereign Powers," "Vindication of the Doctrine of the Trinity," and "A Practical Discourse on Death." **II.** Thomas, an English prelate, son of the preceding, born in London in 1678, died there, July 18, 1761. He was educated at Catharine hall, Cambridge, of which college he became master. In 1704 he was made master of the Temple, in 1714 vice chancellor of the university, and in 1715 dean of Chichester. For his opposition to Dr. Hoadley in the Bángorian controversy he incurred the royal displeasure, and in 1717 was removed from the list of the king's chaplains. He was made bishop of Bangor in 1728, of Salisbury in 1734, and of London in 1748. His works consist principally of sermons, and were published in 5 vols. 8vo in 1830. Of his "Pastoral Letter," published after the earthquake in 1750, nearly 100,000 copies were printed.

SHERMAN. I. A central county of Nebraska, intersected by Loup fork; area, 576 sq. m.; pop. in 1875, 496. It has been recently formed, and is not included in the census of 1870. It consists mostly of prairies. **II.** An unorganized N. W. county of Kansas, bordering on Colorado; area, 900 sq. m. It is drained by affluents of the Republican river. The surface consists of undulating prairies.

SHERMAN, a city and the county seat of Grayson co., Texas, situated in a plain, 12 m. S. of Red river, 240 m. N. N. E. of Austin, and by rail 378 m. N. by W. of Galveston and 632 m. S. W. of St. Louis; pop. in 1870, 1,439, of whom 490 were colored; in 1875, estimated by local authorities at 7,000. It is at the junction of the Houston and Texas Central railroad with the Transcontinental branch of the Texas and Pacific railroad, is regularly laid out, and has many substantial brick buildings, some of them with iron and stone fronts. A court house of brick and stone, to cost about \$80,000, is in course of construction (1875). Sherman supplies several counties with merchandise, and ships large quantities of cotton, hides, &c. It contains an iron foundry, five flouring mills, a cracker factory, a tobacco factory, a soap factory, two banks, ten schools, three newspapers (one daily), and eight churches.

SHERMAN, Roger, an American statesman, born in Newton, Mass., April 19, 1721, died in New Haven, Conn., July 23, 1793. He was a shoemaker till after he was 22 years old. In 1743 he removed to New Milford, Conn., where with a brother he kept a small store. In 1745 he was appointed surveyor of lands for the county, and for several years after 1748 he

furnished the astronomical calculations for an almanac published in New York. He was admitted to the bar in 1754, was several times elected to the colonial assembly, and in 1759 was appointed judge of the court of common pleas. Having removed to New Haven in 1761, he became judge of common pleas there in 1765, and the next year an assistant or member of the upper house in the legislature (a body consisting of 12 persons), both which offices he held for about 19 years, and his judgeship till 1789, the latter portion of the time on the bench of the superior court. He was a member of the continental and the United States congress from 1774 to 1791, when he was elected United States senator. He was also a member of the governor's council of safety, and from 1784 till his death mayor of New Haven; and he was for many years treasurer of Yale college. In 1776 he was a member of the committee appointed to draft the declaration of independence, of which he was one of the signers; and during the war he performed important services on committees and boards. In 1783 he was associated with another judge in codifying the laws of Connecticut. He had been one of the committee which framed the old articles of confederation; and he was one of the most efficient members of the constitutional convention of 1787, and was chiefly instrumental in securing the ratification of the constitution by the state convention of Connecticut.

SHERMAN. **I. William Tecumseh**, an American soldier, born at Lancaster, Ohio, Feb. 8, 1820. He graduated at West Point in 1840, served in the Florida war in 1840-'42, and was at various military posts in the south till 1847, when he went to California, and was acting assistant adjutant general there till 1850. He was on commissary duty at St. Louis in 1850-'52, and at New Orleans till Sept. 6, 1853, when he resigned. From 1853 to 1857 he was a banker in San Francisco and New York, and in 1858-'9 he practised law in Leavenworth, Kansas. He was superintendent of the Louisiana military school at Alexandria from 1859 to January, 1861, when he went to St. Louis. On May 14, 1861, he was reappointed in the army with the rank of colonel, and on the 17th was made brigadier general of volunteers; and he commanded a brigade in the first battle of Bull Run (July 21). In October he was appointed to the command of the department of the Cumberland, but afterward took charge of a camp of instruction at St. Louis till February, 1862, when he was placed in command of the district of Paducah, Ky. He commanded a division in the Tennessee and Mississippi campaign, was in the battle of Shiloh, April 6, 7, where he was wounded, was in the advance upon and siege of Corinth, April 15 to May 30, and was made major general of volunteers May 1. He commanded the hastily organized expedition which attempted to capture Vicksburg, Dec. 27-29. In 1863, in command of the

15th army corps, he led the expedition which carried Arkansas Post by assault, Jan. 11, and till July 3 was actively engaged in the siege of Vicksburg. He was made brigadier general in the regular army, his commission dating from July 4, and during the summer and autumn was engaged in various operations in Mississippi and Tennessee. He commanded the left wing of the army at Chattanooga, Nov. 23-25, and at the beginning of December compelled Gen. Longstreet to raise the siege of Knoxville. In February, 1864, with 20,000 men, he marched to Meridian, Miss., and broke up the railroads centring there. He held the command of the department and army of the Tennessee till March 12, when he took that of the military division of the Mississippi, composed of the departments of Ohio, Cumberland, Tennessee, and Arkansas. Having organized at Chattanooga an army of 100,000 men, he invaded Georgia, engaging the confederate forces under Gen. J. E. Johnston, whom he forced to evacuate Dalton (May 12), at Resaca (15), Cassville (19), Dallas (25-28), and afterward almost daily till the protracted operations about Kenesaw mountain, near Marietta (June 20-July 2), which involved a severe repulse (June 27). He occupied Marietta on July 3, and after several other engagements repeatedly defeated Gen. Hood, Johnston's successor in command, before Atlanta, the severest battle being fought on July 22, and began the siege of that city. On Aug. 12 he was made a major general in the regular army. The battle of Jonesboro was fought Aug. 31. In the night of Sept. 1 Atlanta was evacuated by Hood, and Gen. Sherman occupied the city till the middle of November, when he began his famous march to the sea. He reached Savannah Dec. 13, stormed and captured Fort McAllister, and on the 21st received the surrender of the city. With the Savannah river as his base he marched into the Carolinas, and occupied Columbia, S. C., on Feb. 17. He captured Cheraw on March 3, and Fayetteville, N. C., on the 12th. On the 16th he fought the battle of Averysboro, and on the 19th, 20th, and 21st that of Bentonville, and on the 23d entered Goldsboro. On April 13 he occupied Raleigh, and on the 26th the confederate army under Gen. J. E. Johnston surrendered at Durham Station, N. C., upon terms which were rejected by the government. Sherman's advance to Richmond and Washington, from April 28 to May 24, ended his southern marches of more than 2,600 m. On June 27 he was appointed to the command of the military division of the Mississippi, comprising the departments of the Ohio, Missouri, and Arkansas, with headquarters at St. Louis. On July 25, 1866, he succeeded Gen. Grant as lieutenant general, and on Aug. 11 took command of the division of the Missouri. In November and December he was employed on a special mission in Mexico. He was made general on the vacation of that grade by President Grant,

March 4, 1869. In November, 1871, he obtained leave of absence for a year, during which he travelled in Europe and the East, and was everywhere received with great distinction. On his return he took up his residence in Washington as commander-in-chief of the army, but in October, 1874, removed his headquarters to St. Louis. He has published "Memoirs of General W. T. Sherman, by Himself" (2 vols. 8vo, New York, 1875). **II. John**, an American statesman, brother of the preceding, born at Lancaster, Ohio, May 10, 1823. He was admitted to the bar in 1844, and in 1854 was elected a member of the 34th congress, and was reelected to the 35th and 36th congresses. He was the republican candidate for speaker in the 36th congress, and after a protracted contest failed of election by one or two votes, and was made chairman of the committee of ways and means. In 1860 he was again elected to congress, but in 1861 was chosen a United States senator from Ohio, to which office he was reelected in 1867 and in 1873. He has been from his first entry into the senate chairman of the committee on finance.

SHERRY. See SPAIN, WINES OF.

SHERWOOD, Mary Martha, an English authoress, born at Stanford, Worcestershire, July 6, 1775, died at Twickenham, near London, Sept. 30, 1851. She was a daughter of the Rev. George Butt. Her earliest work, "The Traditions," was published when she was 17 years old; and in her 20th year she published "Margarita," a fiction. "Susan Grey," "The Beautiful Estelle," and some smaller works appeared prior to 1800. In 1803 she married her cousin Henry Sherwood, a captain in the army, and in 1804 accompanied him to India, where she instructed the orphan children of his regiment. In 1818 Capt. Sherwood returned to England with his family, and in 1821 retired on half pay, settling at Wickwar, Gloucestershire, where they resided for the next 27 years. Mrs. Sherwood's works amount to 90 volumes, including "Chronology of Ancient History" and "Dictionary of Scripture Types." Her best known works are "Little Henry and his Bearer," "History of Henry Milner" (3 vols.), "Ermina" (3 vols.), "Roxobel, a Novel" (3 vols.), and "The Lady of the Manor" (7 vols.). Her memoir, mainly an autobiography, has been published by her daughter.

SHETLAND ISLANDS, or *Zetland*, a group in the Atlantic ocean, forming the northernmost part of Great Britain, mainly extending from lat. 59° 50' to 60° 50' N., and from lon. 0° 45' to 1° 45' W.; area, about 450 sq. m.; pop. in 1871, 31,608. There are about 100 islands, not more than one fourth of which are inhabited. The largest island is Mainland, which contains about three fifths of the total area and two thirds of the population; and those next in importance are Foula or Foul (the westernmost), Papa-Stour, Muckle Roe, Whalsey, Yell, Bressa, Fetlar, Unst, E. and W. Burra, Fair (the southernmost), and the three Skerries.

Lerwick, on the E. coast of Mainland, is the capital. The coasts are generally bold and precipitous; they vary in height from 500 to 1,200 ft. above the sea, and are indented with numerous deep landlocked bays and by long narrow arms of the sea called *voes*. The interior is not generally much elevated above the coasts, the highest summit in the group, in the N. part of Mainland, rising 1,476 ft. above the sea. The surface is mostly rugged, or covered with moss, and the only tolerably fertile soil is in a few of the valleys and in the neighborhood of some of the bays. The geological formation consists of sandstone, gneiss, blue limestone, clay and mica slate, and granite. Copper has been discovered on one of the islands, and chromate of iron is exported from Unst. The climate is not remarkably cold, but there is much wet and tempestuous weather, and fogs are frequent. In winter it is dark and dreary, but about midsummer the sun scarcely disappears below the horizon. Very little of the soil is arable. The principal crops are oats, barley, potatoes, and turnips. The live stock on the group are very diminutive; and small ponies, or shelties, are bred wild on the heaths and pastures and exported in great numbers. About 4,000 of the inhabitants are employed in fishing. Herring, cod, ling, and tusk are the principal kinds caught. The fishing season lasts about three months during summer. The only important manufactures are hosiery, straw plaiting, and the preparation of kelp; but the two latter have fallen off greatly of late years. The exports are fish, oil, cattle, horses, eggs, and woollen articles knit by hand. The value of exports is £100,000 a year. Places of worship are numerous, and nearly all the inhabitants can read and write. The people are small, active, and hardy.—Shetland is supposed to be the Thule of the ancients, and the first people known to have inhabited the islands were of Scandinavian origin. The present inhabitants are of their race. About 875 Harold Harfager reduced all the northern and western islands to his authority. Sigurd became earl of Orkney, Caithness, and Shetland; but the authority of the earls was little felt in the last, as they had no jurisdiction in civil affairs, and were merely military protectors or leaders. When James III. of Scotland married the princess Margaret of Denmark in 1469, he received as a pledge for the payment of her dowry the Orkney and Shetland islands, and they were never redeemed. The Shetland islands with the Orkneys form a district which returns one member to parliament.

SHEW BREAD (Heb. *le'hem hapanim*), the name of 12 unleavened loaves placed upon a table in the outer compartment of the Jewish sanctuary. Though the number 12 represented the 12 tribes, it was not diminished after the secession of 10 of the tribes from the Mosaic worship, probably because the covenant with the whole people was regarded as eternally

binding. The loaves were placed in two piles, one above another, and were changed every sabbath day by the priests. The removed bread became the property of the priests, who alone had a right to eat of it, and only in the holy place. But in cases of emergency they incurred no blame by giving it to persons who were in a state of ceremonial purity, as in the instance of David and his men (1 Sam. xxi.).

SHIAHS, Sheeahs, or Shiites (Ar. *shia*, a faction), a sect of Mohammedans, who believe that Ali, the son-in-law of Mohammed, was by right entitled to be his immediate successor. The proper name of the sect is *Shiat Ali*, or Ali's party. After the death of the prophet the party that supported Ali's rivals, Abubekr, Omar, and Othman, successively effected their elevation to the caliphate before him, and he did not attain that office till 23 years after the death of Mohammed. The Shiah consisted mainly of the Persian portion of the early adherents of Islam. They entertained the most exaggerated notions concerning Ali, and even during his lifetime propounded doctrines assigning to him a certain participation in the nature and attributes of God, and placing him above Mohammed. The Shiah reject such of the traditions of Islam as relate to the first three caliphs or any other enemies of Ali, and they accept certain traditions which are rejected by the Sunnis, or orthodox Mohammedans. To the common formula of faith, "There is no God but Allah, and Mohammed is his prophet," they add, "Ali is the vicar of God." The Shiah doctrines made rapid progress, and in the early centuries of Islam repeatedly attained to power (see CALIPH); and at present they form the majority of the Persian and Hindoo Mohammedans.

SHIAWASSEE, a central county of Michigan, intersected by Shiawassee river, a head stream of the Saginaw; area, 576 sq. m.; pop. in 1874, 21,773. The surface is undulating and the soil fertile; timber is abundant, and bituminous coal is found. It is traversed by the Detroit and Milwaukee railroad, and the Jackson, Lansing, and Saginaw division of the Michigan Central. The chief productions in 1870 were 484,587 bushels of wheat, 262,861 of Indian corn, 202,510 of oats, 17,341 of barley, 240,162 of potatoes, 32,464 tons of hay, 192,612 lbs. of wool, 491,606 of butter, and 32,999 of maple sugar. There were 4,718 horses, 5,864 milch cows, 1,480 working oxen, 6,142 other cattle, 45,536 sheep, and 8,399 swine; 4 manufactories of furniture, 7 of iron castings, 2 tanneries, 10 saw mills, 6 flour mills, and 1 woollen mill. Capital, Corunna.

SHIELD (Ger. *Schild*), a piece of defensive armor, which before the invention of gunpowder was in almost universal use, but is now employed chiefly by barbarous races. It was sometimes called also buckler and target. The shield of the ancients from the earliest times was a framework of twisted osiers or light wood, over which one or more thicknesses of

ox hide and sometimes ornamental or defensive metal work were fastened; and those described by Homer covered the body from the face to the knee. Shields were carried on the



FIG. 1.—1. Scutum, from Trajan's Column. 2. Clipeus, from a Greek Vase.

left arm, and were of various shapes and sizes. The shield called by the Romans *clipeus* was large and round, having sometimes a projection in the centre of the exterior, called the *umbo*, which frequently terminated in a spike. The *scutum* of the Roman legionary soldiers was oblong and rectangular, and was generally 4 ft. high by 2½ ft. wide. The *parma*, a smaller round framework of iron covered with hides, was used by light troops; the *pelta*, which was lighter still and sometimes elliptical, but oftener truncated at the top with one or more semicircular indentations, was introduced among the Greeks by Iphicrates, and the troops armed with it were called *peltastæ*. The *cetra* was a small round target, borne by many ancient races, and probably identical with that formerly used by the Scottish highlanders. In time of peace the Greeks hung their shields in the temples, removing the handles to render them unserviceable in case of a popular outbreak. The Roman soldiers inscribed their names upon their shields, and men of family emblazoned them with devices illustrating the heroic feats of their ancestors,



FIG. 2.—1. 2. Amazons with the Pelta, from a marble bass relief. 3. Parma, from a terra cotta bass relief.

and sometimes with their own portraits, a practice to which may be ascribed the modern use of armorial bearings. To lose a shield in battle, or to return without it, was a mark

of cowardice. In the middle ages the knights and men-at-arms, being clothed in complete mail, had less need of a shield, and it fell into gradual disuse. The Norman shield until the middle of the 12th century was long and of the form called kite or pear-shaped; but subsequently it became smaller, and as a vehicle for bearing heraldic devices assumed a variety of shapes which have been preserved to the present day. (See ARMOR, and HERALDRY.)

SHIELDS, North and South, two towns of England, situated respectively in the counties of Northumberland and Durham, on the N. and S. banks of the river Tyne, near its mouth in the North sea, 6 m. below Newcastle, and 250 m. N. N. W. of London; pop. of North Shields in 1871, 8,619; of South Shields, 45,336. The manufactures of both consist principally of articles used for nautical purposes, and of glass, pottery, and alum. Ship building, once extensively carried on, has much declined, and is now chiefly confined to repairing, for which there are large docks. The entrance to the Tyne is difficult, but there are two lighthouses, one 123 and the other 77 ft. above the sea. There is an extensive stone pier at the mouth of the harbor. The name Shields is derived from the *sheels*, or sheds, in which the fishermen of the Tyne formerly lived. Interesting Roman remains were discovered at South Shields in 1875.

SHITES. See SHIAHS.

SHIKARPOOR, a town of British India, in the province of Sind, 15 m. W. of Sukkur on the Indus, on the route by the Bolan pass between Hindostan and Afghanistan; pop. about 30,000, one third Mohammedans. It stands on a low plain abounding with fruit trees, and inundated by the river at certain seasons. The place is of considerable commercial importance, and fine cotton goods are manufactured.

SHILLING, an English silver coin equivalent to 12 pence sterling, or $\frac{1}{20}$ of a pound. In reducing English money of account to United States money, a shilling is equivalent to 24.3325 cts., or, within the 1200th part of a cent, to 24 $\frac{1}{2}$ cts. The value of the coin as compared with the United States silver trade dollar, according to the proclamation of the secretary of the treasury of Jan. 1, 1875, is 21.4365 cts., or, within less than the 125th part of a cent, to 21 $\frac{1}{2}$ cts.—Many of the states while colonies had issued bills of credit which had depreciated in different degrees in the different colonies. Thus in New England currency (used also in Virginia, Kentucky, Tennessee, Indiana, Illinois, Missouri, Mississippi, Alabama, and Florida), after the adoption of the decimal system, the pound in paper money was worth only \$3.333, and the shilling 16 $\frac{2}{3}$ cts., or 6s. to \$1; in New York currency (also in North Carolina, Ohio, and Michigan) the pound was worth \$2 50, and the shilling 12 $\frac{1}{2}$ cts., or 8s. to \$1; in Pennsylvania currency (also in New Jersey, Delaware, and Maryland) the pound was worth \$2 70, and the shilling

13 $\frac{1}{2}$ cts., or 7s. 6d. to \$1; and in Georgia currency (also in South Carolina), the pound was worth \$4 20 $\frac{1}{2}$, and the shilling 21 $\frac{1}{2}$ cts., or 4s. 8d. to \$1. In many parts of the country these denominations continued to be used long after they ceased to be represented by actual money, and the reckoning by shillings and pence is not yet entirely abandoned. In Canada the shilling was formerly reckoned at 20 cts., or 5s. to \$1; but since the introduction of decimal currency in 1871, 4s. 2d. make a dollar.

SHILOH (Heb., rest, peace), a town of ancient Palestine, in the division of Ephraim, on a high mountain N. of Bethel. It was the seat of the ark of the covenant from the last days of Joshua to the time of Eli. An annual "feast of the Lord" was observed at Shiloh, and one of these celebrations was made an opportunity for the remnants of the defeated Benjamites to supply themselves with wives, by lying in ambush in the vineyards and seizing some hundreds of the dancing women. After the carrying off of the ark by the Philistines, at the close of Eli's life, Shiloh sank into total insignificance. Its site is now identified with Seilun, a small place with some Roman remains, 20 m. N. of Jerusalem.—The words in Gen. xlix. 10, which are rendered in the authorized English version "until Shiloh come," and are by Christian theologians referred to Christ as prince of peace, are explained by Jewish writers as meaning "until he (Judah) come to Shiloh," and by Vater, Gesenius, and other critics translated "until rest come."

SHILOH, a locality, so called from a church situated there, near Pittsburgh Landing, on the Tennessee river, in Hardin co., Tenn., where a battle was fought, April 6, 7, 1862, between the Union forces under Gen. Grant and the confederates under Gens. A. S. Johnston and Beauregard. The battle is sometimes called that of Pittsburgh Landing. After the evacuation of Nashville, the confederate forces in the west were concentrated near Corinth, Miss., while Grant was preparing to move so as to cut off their communications in western Tennessee. On April 1, with about 32,000 men, he reached Pittsburgh Landing, where he was to be joined by Gen. Buell. Johnston, who had about 45,000 men, moved from Corinth and attacked Grant on the morning of the 6th. The attack fell first upon the divisions of W. T. Sherman and Prentiss, both of which were driven back, three regiments of the latter being captured and the whole army forced back almost to the landing. In the afternoon Buell's advance appeared on the opposite bank, and a single division crossed while the battle was going on. Gen. Johnston was mortally wounded, and the command devolved upon Beauregard, who assailed the Union centre and left, on which most of the artillery had been concentrated, and which were also covered by two gunboats. The attack was repelled, and at night a bombardment was opened, which compelled the confederates to retire a little.

The remainder of Buell's command crossed during the night, raising the Union force to about 45,000. Grant opened the action early on the morning of the 7th, by an artillery fire, before which the confederates fell back. This was followed by a general assault, which was obstinately resisted. The action continued till 4 P. M., when the confederates retreated. The Union loss, as officially reported, was 1,700 killed, 7,495 wounded, and 3,022 prisoners; in all, 12,217. The confederate loss, as reported by Beauregard, was 1,728 killed, 8,012 wounded, and 959 missing; in all, 10,699. (See CORINTH.)

SHIMONOSEKI, a seaport of Japan, in the province of Nagato (Choshu), on the S. W. point of the main island; pop. about 10,000. It commands the strait of Shimonoseki, which connects the Inland sea and the sea of Japan. The town consists chiefly of one long street. A famous naval battle between the fleets of the Taira and Minamoto families, in which 1,200 junks were engaged, was fought near it in 1185. In 1864 the forts near Shimonoseki were bombarded and destroyed by a combined fleet of one United States, five British, three French, and four Dutch men-of-war, in retaliation for the act of the daimio of Choshu in firing on the vessels of those nations while they were passing through the strait. Besides \$420,000 demanded as a compensation for injuries, the Japanese government was obliged to pay an indemnity of \$3,000,000, of which the United States received \$750,000. In 1873 Shimonoseki was nearly destroyed by fire.

SHINER. See DACE.

SHINKING, or **Liaotung**, a province of southern Manchouria, sometimes included in China proper, bounded N. W. and W. by Mongolia, from which it is separated by a palisade barrier, E. by Corea, S. by the bay of Corea and the gulf of Liaotung, and S. W. by the great wall; pop. according to the census of 1812, 2,167,286. It is mountainous and traversed by the Liau-ho, Shin-orn, and other rivers. The products include timber, iron, coal, horses, cattle, sheep, various cereals, silk, ginseng, and rhubarb, the last two a government monopoly. The chief town is Mukden or Shinyang. (See MANTCHOORIA.)

SHINTO, or **Sinto**. See JAPAN, vol. ix., pp. 537 and 562.

SHIP, a term applied in general to all vessels navigating the sea, and in particular to sailing vessels with at least three masts carrying square sails. The masts are known as fore, main, and mizzen. The mizzen is sometimes merely fore-and-aft rigged, carrying no yard; the vessel is then known as a bark. Brigs have two masts rigged with square sails, and are generally smaller than ships; they are convenient for handling with few men, and were formerly very popular, especially in the West India trade. Hermaphrodite brigs (partly brig and partly schooner) carry on the mainmast only fore-and-aft sails; they are usually of

inferior size to full-rigged brigs. Schooners are two-masted and fore-and-aft rigged, carrying jib and flying jib, foresail and mainsail, with a gaff topsail over each of the latter, and a long square sail for the foremast, only brought out for use when the wind blows steadily from astern. The topsail schooner has a square topsail and sometimes a topgallant sail on the foremast, but the lower sail is the usual fore-and-aft foresail. These are light and easy to navigate, and excellent sea boats. Cutters used for revenue service were formerly topsail schooners; steamers have now taken their place. When it is desired to increase the capacity of schooners without increasing their draught, they are considerably lengthened, and a third mast is added to them, when they are known as three-masted schooners. Pink stern schooners, or those with high-pointed sterns, were once favorites in the cod and mackerel fishery of New England; they carried no jib, but only a foresail and mainsail. Sloops are small, generally less than 125 tons, with one mast. They carry a jib and mainsail; the latter by the great length of the mast and boom is very large. They commonly have a gaff topsail, and sometimes a square topsail, and a long square sail occasionally set. They are adapted only for rivers and comparatively smooth waters. A vessel is sometimes seen in our harbors with three masts, the foremast rigged like that of a ship and the others schooner-rigged without topsails; this is known as a barkantine.—The nations of antiquity inhabiting the shores of the Mediterranean and Red seas, and foremost among them the Phœnicians, attained considerable skill in the construction of vessels, and made long voyages. The Bible contains the description of an antediluvian vessel, Noah's ark; and it is remarkable that its proportions of length, breadth, and depth are almost precisely the same as those considered by our most eminent architects the best for combining the elements of strength, capacity, and stability. According to Gen. vi. 15, the ark was 300 cubits long, 50 cubits broad, and 30 cubits high; *i. e.*, six times the breadth for the length, and three fifths of the breadth for the depth. The ships represented upon ancient Egyptian tombs were long galleys with one mast and a large square sail, which was sometimes of linen colored or white, and sometimes of papyrus with one, and in the later periods with two yards. These were of great size and length, so that men could walk out upon the lower one, holding on by the ropes by which it was suspended from the top. The vessels were made of planks of pine, fir, or cedar, each end rising up out of the water by a long slope, well adapted in shape for easy propulsion, and were furnished with oars, upon which the war vessels were wholly dependent when in action, and all of them indeed except when the wind was favorable. The ships of war alone were decked wholly or in part, and upon the larger ones the deck was high, and in some instances

covered with structures resembling houses. According to Pliny, the Thasians were the first to construct full decks. Merchant vessels were round-bottomed for the sake of capacity. The prow was furnished with an elaborately carved image, as a boar's head, dog's head, &c., which was the symbol after which the ship was named. This symbol was termed the *insigne* (whence our word ensign), and has descended to our own times as the figurehead. Upon the stern, which rose high out of water, like that of a Chinese junk, was the image of the tutelary god with other ornamental devices. A peculiar feature in the war vessels was a projecting beak, at first made above the water line, and afterward below it, armed with pointed irons or the head of a ram, the object of which was to pierce the sides of other vessels against which it was run. This was the only part built of oak or hard wood. From want of strength in the construction of ancient vessels, and the necessity in their voyages of avoiding exposure to rough seas, they were bound around the outside with broad and thick ropes. During the gale which preceded its shipwreck the vessel which bore St. Paul, bearing the sign of Castor and Pollux, had to be "undergirded" (Acts xxvii. 17). The great ships of Ptolemy Philadelphus were provided with as many as 12 such bands, each of which was 900 ft. long. They were sometimes carried on board the vessels, to be put on when needed in rough weather. As the ships depended chiefly upon the use of oars, the arrangements for these were their most marked feature, and gave distinctive names to the several classes of vessels. (See GALLEY, and NAVY.) A Roman ship of the time of Trajan, sunk in the lake of Riccia and raised after it had lain there more than 1,300 years, was described by Leo Baptista Alberti in his book of "Architecture" (v. 12); it was built of planks of pine and cypress, daubed over with Greek pitch and calked with linen rags; the wood was in a good state of preservation; the outside was sheathed with sheet lead fastened with small copper nails.—In the middle ages navigation and ship building declined, and little is known of the vessels of that period. The expedition made by the Anglo-Saxons to England, A. D. 449, was in frail vessels, their sides made of wicker work and covered with skins. Better vessels were undoubtedly used by the Northmen in their perilous voyages. For war purposes the long low galleys of the Mediterranean gradually replaced the ancient triremes. Alfred the Great adopted them in his wars with the Northmen, and he first made the English navy unequalled. In the latter part of the 14th century the best ships were of Norman construction; in the representations of their war vessels of this period the rudder is first seen as a substitute for the great steering oars always before in use. In southern Europe the credit of first building vessels to be propelled by sails alone has generally been conceded to the Genoese. In

England many such vessels were employed as early as 1344. The use of cannon in naval warfare at the siege of Calais in the reign of Edward III. led to the enrolment of ships belonging to the crown. Ships of war had been numerous in the reign of John, but were owned by individuals; the government provided at that time for their accommodation the royal dockyards at Portsmouth. The ships of these periods were remarkable for the great height of their sides, their bulky rounded models, and the simplicity of their rig. They had no bowsprit, and seldom more than one mast; the sail was attached to a yard, which was let down to the deck when not used. They were navigated by 17 to 20 sailors only. Henry V. added to the number of English ships. His vessels were of 100 to 600 tons each, some with three, others with two masts, with short topmasts and a forestage or forecastle built up to a considerable height for the soldiers. At the mast heads were topcastles, in which men were stationed during an engagement to annoy the enemy with darts and other missiles. In the middle of the 15th century William Canynge, a famous merchant of Bristol, built many large ships, one at least of 900 tons burden, and employed altogether not less than 2,850 tons of shipping and 800 mariners for eight years. The navies of the Netherlands, Venice, Spain, and Portugal attained great importance in that century. Many of the ships being so far improved as to sail upon a wind, and the compass and astrolabe having come into use, it was now possible to engage in longer voyages and prosecute explorations in unknown seas. The discovery of America and of the passage round the cape of Good Hope were early fruits of these improvements. The Portuguese employed small vessels in their voyages of discovery, as the best adapted for explorations along unknown coasts; but the Spaniards cultivated the art of building large ones, and long maintained a superiority in this respect. The Great Harry, built in 1488, is considered to have been the first ship of the English navy as it is seen to-day, although a standing fleet was first formed under Henry VIII. She had four masts, carried courses, fore and main topsails, and topgallant sails, and had guns in broadside on two covered decks. (See NAVY.) The vessels of this period, built up with high castellated structures at each end, seem intended rather for display than for actual service, and must have been far inferior sailers to the galleasses and galleons of the Mediterranean, which had succeeded the galleys. These were of moderate height above the water, and the first had overhanging bulwarks like the guards of modern steamboats, greatly adding to the width of the decks and affording room for the rowers. The galleons, on the contrary, which depended on sails alone, were drawn in at the top to such an extent as to contract their breadth from the water line fully one half; this feature has

ever since prevailed in many European ships. Henry VIII. established the dockyards at Deptford and Chatham, and brought together from foreign countries, and especially from Italy, many skilful shipwrights and workmen. In the reign of Elizabeth the superior management of the English ships over the much larger ones of the Spaniards, with their three tiers of guns, was fully established in the contests with these vessels; and great progress was made under the encouragement of the queen in increasing and perfecting the mercantile marine. The East India company was chartered in 1600, and the increasing traffic with the distant countries of Europe and America rapidly stimulated the demand for the best vessels and called forth the ingenuity of the ship builders. Sir Walter Raleigh gave much attention to the improvement of ships, and his publications entitled "Invention of Shipping" and "Concerning the Royal Navy and Sea Service" greatly added to the general interest in the subject. The shipwrights' company, established in 1605, was incorporated in 1612, and general charge was given to the association over ship building throughout the kingdom. The first master was Phineas Pett, of a family distinguished for the principal engineers it furnished to the royal navy from about the middle of the 15th century to the end of the reign of William III. He built the Royal Prince in 1610, a ship of 114 ft. keel, 44 ft. breadth, and 1,400 tons burden, introducing the great improvement of cutting off the long projection of the prow, hitherto universally adopted, and also much of the cumbersome top hamper of the older ships. The first English three-decker was built by his son Peter Pett in 1637. She was called the Sovereign of the Seas, and had the reputation of being the best man-of-war in the world until she was accidentally burned in 1696. An account of her armament is given in NAVY. She was 232 ft. in length over all, 128 ft. length of keel, 48 ft. in breadth, and of 1,637 tons. The drawings represent her as a full-rigged ship carrying square sails altogether, topgallant sails, and royals, but no jibs or staysails. Under the bowsprit was a square sail suspended from a yard, such as is now called the spritsail. The hull was somewhat lofty in the bow and stern compared with modern ships, but still greatly reduced from the older ones. A considerable portion of the additional length above water to that of the keel was from a long triangular beak. The Constant Warwick, also built by Peter Pett in 1646, and designated a frigate, was specially intended for fast sailing; she was light, with low decks, of 85 ft. keel, 26 ft. 5 in. breadth, 13 ft. 2 in. depth, and 315 tons burden; she carried 32 guns and a crew of 140 men, and soon acquired a high reputation for her conquests among the Dutch privateers. But the Dutch ships at this time were quite equal to the English, and their navy was altogether the best in Europe, the result of their

continual wars with Spain. The merchant vessels of England were superior in sea-going qualities to those of the royal navy, and during the wars with France and Spain they boldly continued their trading voyages, two or three of them usually sailing in company. During the 18th century the French attained a decided superiority in the size and models of their ships, and the Spaniards readily adopted the improvements of the French. Their largest vessels were two-deckers only until after 1763, and their largest armaments were of 84 guns. In this respect they were inferior to the English three-deckers carrying 100 guns; but in 1768 the French adopted the English system, and built ships of 110 and 120 guns, and of 196 ft. length by 50 ft. breadth and 25 ft. depth of hold, while the English in some instances copied the lines of the French ships that fell into their hands. But it is admitted even by the English themselves that their system of ship building received no aid from the applications of science, while the French availed themselves of the highest mathematical talent as well as of practical experience and skill. To the latter and to the Spaniards also is due the credit of the important improvements made in ship building in modern times up to the present century; and yet in the United States, where the same course has been pursued as in England, of seeking aid only from experience and natural talent, the highest success has since been attained in designing the most perfect models for the special purposes required. The American ship builders were the first to entirely abandon the cherished features of the European models, as the high poop and inflected topside. Their frigates proved their superiority to all other vessels of war in actual service, and before the introduction of steam their Liverpool packet ships were the finest vessels afloat. Their fore-and-aft rigged vessels, less known abroad than the larger ships, were still more remarkable for originality and perfect success in their designs. The river sloops and coasting schooners were peculiarly American. The schooners of the Chesapeake were especially famous under the name of Baltimore clippers. Broad of beam before the centre but above the water line, sharp in the bow, deep aft, long and low, they presented admirable forms for capacity, for stability to sustain a large amount of canvas, for great speed, and for holding their course on a wind with little drifting to leeward. The masts were long and slender, the sails unusually large for vessels of their size, and of so true cut and perfect set that no portion of the propelling effect of the breeze that reached them was wasted. Close-hauled, they drew well with the vessel running within 40° or 45° of the wind, while the best equipped frigate would be sharp set at 60°. The superior sailing qualities of these schooners were shown in their success as privateers and freedom from capture in the war of 1812, and

were most conclusively established when the yacht *America*, built on the same principles, carried off the prize in 1851 in competition with the English yachts that had confidently challenged the world to a trial of speed. From these schooners the step was natural to the famous clipper ships by the adoption of the square rig for larger vessels of similar model. They were called into existence by the increasing importance of the East India trade, in which speed and punctuality were more essential than mere stowage capacity, and still more by the sudden springing up of the California trade with its immense passenger traffic. In vessels of this class the voyage round Cape Horn lost its terrors, and the passage from New York to San Francisco was confidently calculated within a few days, and this at hardly half its former length. The clipper ship *Great Republic*, built by Donald McKay of East Boston, was an excellent type of this class, and was the largest, if not the fastest, merchantman ever constructed. Her capacity was about 4,000 tons, and her original dimensions were 325 ft. length, 53 ft. width, and 37 ft. depth. A peculiar feature in her model was the rising of her keel for 60 ft. forward, gradually curving into the arc of a circle as it blended with the stem. She had four masts, all provided with lightning rods. The after one, called the spanker mast, was fore-and-aft rigged, of a single spar; the others were built of hard pine, the parts doweled together, bolted and hooped over all with iron. The main yard was 120 ft. long. A single suit of her sails consisted of 15,653 yards of canvas. Even in 1851 the performances of some of the clipper ships on long voyages were far superior for days together to those of the steam vessels of that time, and on the whole run hardly inferior. In that year the *Flying Cloud* made the passage from New York to San Francisco in 89 days and 21 hours. Her greatest distance from noon to noon of any day was 374 knots (433½ statute miles), which, allowing for difference of longitude, was made in 24 h. 19 m. 4 sec., or at the rate of 17.77 m. an hour. In 1852 the *Comet* arrived in New York from San Francisco in 83 days, and the *Sovereign of the Seas* from the Sandwich islands in 82 days. The greatest distance made by the latter from noon to noon in any day (in this case 23 h. 2 m. 4 sec.) was 362 knots (419 m.), or at the rate of 17.88 m. an hour. From March 9 to March 31, from lat. 48° S. in the Pacific to 36 S. in the Atlantic, the ship made 29° of latitude and 126° of longitude, equal to 6,245 statute miles, or a daily average of 283.9 m. During 11 of these days consecutively her daily average was 354 m., and during 4 consecutive days 398½ m. Her daily average for the whole distance of 17,597 m. was 222.7 statute miles, or at the rate of over 9 m. an hour for 1,896 consecutive hours.—The two prominent features that constitute the essential improvements of modern times are the shape of the bow and the in-

creased length of the vessel. In place of the convex form noticed in the older ships in tracing the lines from the stem aft along and below the water, is now substituted a concave surface giving to the bow the shape of an elongated wedge slightly hollowed on the face, by which the waters are more easily parted and thrown aside. This wedge shape is extended even to beyond the centre of the ship, so that the broadest part, instead of being as formerly one third the distance from the bow, is now about the same proportional distance from the stern. Above the water line the old proportions may still be retained. This form of bow is not by any means altogether new, having been adopted by the Spaniards in past times and by various barbarous nations for their small craft; but its merits not being appreciated by other European nations, it was sacrificed for the sake of greater stowage, especially by the English, who were the more impelled to this course by reason of the old tonnage laws, in force up to 1836, as regards the method of measurement for regulating the dues, the increase of capacity gained in the bow not being reckoned in the estimate. Thus the round swelling bow became the established form, in the correctness of which the builders felt confirmed by the similar shape in the head of the whale and of the codfish. The hollowed lines drawn from the stem back on each side the ship were designed by Mr. Scott Russell from his observations made as far back as 1832 upon the shape of the wave set in motion, as by the influx of water from the discharging of a lock of a canal, which travels at rates corresponding to the depth, as 8 m. an hour for 5 ft. depth, 10 m. for 7 ft., 15 m. for 15 ft., 18 for 20, 20 for 30, 25 for 40, and 30 for 50. Hence he designated them wave lines, and the form of the bow they produced he called the wave form. The lines for the stern he also established by study of the refilling or replacing or following wave, as necessarily falling in cycloidal curves. Definite lengths indicate definite rates with a given power, and it would be impossible to force a ship through the water at rates much exceeding those indicated as adapted to the length of her lines without an extravagant expenditure of power. Additional length of body inserted in the centre seems to have no effect, except as it presents an increased surface for adhesion of the water. Thus the old idea that there must be a certain proportion between the length and breadth of a vessel, as that which for a long time was adopted in practice of one fourth the length for the breadth, proves to be entirely false. The speed does not appear to be affected by the shape of the vessel across her middle or her midship section, nor by differences of depth to a considerable extent. The proportion between the speed for which a ship is to be designed and the length of entrance and run, Mr. Russell states to be three fifths of the whole length for fore body

and two fifths for after body. For a speed of six statute miles an hour the length of entrance should be, according to his rule, 15·12 ft., length of run 10·8 ft.; for 8 m., 26·88 ft. for entrance and 19·2 for run; for 10 m., 42 and 30; for 15 m., 94·50 and 67·5; for 20 m., 168 and 120. The great experiments of the English in the construction of their largest steamers have been made on these principles. Before their adoption it was taught by the most experienced ship builders, and in this opinion Mr. Scott Russell was himself educated, that it was impossible to force steamboats through the water at a greater rate than 9 m. an hour. He had even seen engines of 50 horse power taken out of one of the short bluff-bow steamboats, and replaced with others of 75 horse power, with the effect of increasing her speed only about a quarter of a knot an hour. With the increased power the resistance in front was much more than proportionally increased, keeping down the speed in this instance to about the same amount. This was in accordance with the mathematical deduction of the resistance in passing through water increasing as the squares of the velocities, or nearly so, and the power necessary to impart an increased velocity varying nearly as the cube of such increased velocity. It is not strange therefore that the opinion prevailed, that if a rate of 12 or 14 m. could ever be attained in sea-going steamers against the enormous resistance, increased as it must be by the tremendous shock of opposing waves, no vessel could be strong enough to complete a voyage. Yet in the United States the fallacy of these views had been practically demonstrated in the steamboats on the Hudson river for several years before the principles of their success were recognized by the English ship builders. In 1827 these boats were making the trip from New York to Albany in 12 hours, the distance being about 145 statute miles, and the trip usually including 12 stoppings, at six of which the boats were brought to and fastened to the wharves. Several crossings of the river also added to the distance and the time over a trip direct. In 1829 the passage had been accomplished in 10½ hours, in 1831 in 10½ hours, and in 1832 in 9 h. 18 m. (See paper by William C. Redfield in "American Journal of Science," vol. xxiii., 1833.)* These boats were long and sharp, furnished with "cut-water bows," and of dimensions in some instances as follows: length 233 ft., breadth of hull at the water line 28 ft., depth of hold 10 ft., draught of water 4½ ft.; length 180 ft., breadth at the water line 28 ft.; length 220 ft., breadth 25 ft.; and length 145 ft., breadth 27 ft. In 1832 Mr. Russell demonstrated theoretically the princi-

ples upon which such speed was attainable, and in 1837 a river steamer called the *Vesper*, built on the lines he recommended, was actually run on the Thames at about 12 m. an hour.—The direction in which improvements in the construction of fast ships were to be made being thus determined by theory and practice both in England and the United States, an active rivalry sprang up between the two nations, each producing almost every year steamers of surpassing excellence. But the American government refusing to pay subsidies to steamship lines, the scale turned in favor of the English, whose resources were greater in other respects than those of the Americans. This was especially apparent when in the course of the contest it was discovered that a limit was encountered to the required elongation of the ships, from the want of strength in wooden timbers, however large and well put together, to bear the increased strain; and that resort must be had to iron plates riveted together, the suitability of which for such use was fully established by the success of the Britannia bridge. In 1855 the Cunard iron steamer *Persia* was constructed, of 360 ft. length of hull, 45 ft. breadth, and 32 ft. depth, and of capacity exceeding by 1,200 tons the largest of the other ships of the same line. The next of these grand attempts was the construction of the *Great Eastern*, in which the principle was put to an extreme test upon a length of hull of 680 ft., a breadth of 82½ ft., and a depth of 58 ft. Her lines were designed by Mr. Scott Russell in exact conformity with his theoretical wave lines. Those of the bow are 330 ft. in length, and the length of the run is 226 ft., the filling in of parallel body to afford the capacity wanted being 120 ft. This middle portion, as already remarked, is supposed to have no effect so long as the length in other respects is sufficient for attaining the required speed with the given power. In this case the power furnished could be expected to give only 15 m. an hour, and this she attained. For further account of the use of steam in navigation and the history of this application, see STEAM NAVIGATION.—The substitution of iron for wood in the construction of vessels was first made experimentally in 1821, but did not come into practical use till 1829–'30. In these years the late John Laird of Birkenhead built some iron cargo lighters at his works there, where the business of iron ship building has since been uninterruptedly continued, and upward of 400 iron vessels have been completed. In 1830–'31 the late Sir William Fairbairn built a small iron steamer at Manchester, and he afterward constructed at Millwall many steamers of the same material. In France and in the United States iron has been partially introduced into wooden ships, bars of iron being employed to great advantage for a diagonal bracing covering the inner surface of the timbers with a complete network; horizontal stringers of plate iron are also fas-

* Since the publication of the paper by Mr. Redfield still increased rates of speed have been attained by these boats, till, in October, 1860, the steamboat Daniel Drew made the trip in 6 h. 50 m., including in this five landings and several crossings involved by them; these may fairly be considered as consuming 50 minutes, thus making the rate 24 m. an hour, the highest speed ever recorded upon the water.

tened to the sides within at intervals from the deck to the keelson, which is also of iron. The beams are also made of iron, shaped like those used in house architecture, and in various other parts this metal is substituted for wood, the advantage being greater strength with less weight and the occupation of less room. Iron frames are now used exclusively in the English navy. Ships constructed wholly of iron are lighter than those of the same tonnage made of wood, and consequently can carry larger freights. Their size moreover being capable of enlargement beyond the dimensions to which wooden vessels must be limited, they admit more than the latter of profiting by the principle, that the larger the capacity the less proportional part of it need be devoted to the transportation of the fuel required, and the more may be devoted to the cargo. Iron ships are built upon a frame of ribs and longitudinal pieces, upon which the outer plates are secured by bolts and rivets passing through their overlapping edges. Lloyd's rules for iron ships will be found in "Ship Building in Iron and Steel," by E. J. Reed, p. 491. In 1858 a steamer called the *Rainbow*, of 170 tons and 130 ft. length by 16 ft. beam, intended for the Niger expedition, was built with plates of steel. These were rolled from lumps of crude steel which were exposed four hours in a close furnace to a temperature a little below the melting point; by this process the steel was made to assume a more homogeneous texture and uniform strength. Its advantage over ordinary iron plates is that equal strength to that of the latter is obtained with only half the weight. The boilers of the steamer were also made of it.—The recent important changes in ships intended for naval service are: 1, the introduction of light and swift vessels propelled by steam, carrying a few heavy guns, and able by their light draught to run into rivers and shoal waters; and 2, that of floating batteries, some account of which has been given in the article IRON-CLAD SHIPS. Since 1858 the French and English governments have vied with each other in the construction of fighting ships in which the maximum powers of offence are afforded the utmost security from hostile shot consistent with buoyancy. The contest between offence and defence is in reality coeval with the history of ship building. In the earliest sea fights protection from the missiles of the enemy was sought by placing shields, interlaced, on what now would be called the "gunwale" of war galleys. During the middle ages the same expedient was resorted to. At the siege of Tunis in 1535 the *Santa Anna*, one of the fleet of the renowned *Andrea Doria*, was plated with lead, and successfully resisted the artillery of the enemy. The light armaments of the last century often failed to penetrate the stout oak or teak sides of well built ships. Even so late as 70 years ago the ships of Nelson and Collingwood, so long under a concentrated fire as they bore down on the enemy's line at

Trafalgar, would have been completely demolished had not the powers of attack and defence been so nearly equal. (See IRON-CLAD SHIPS.)—Composite ships are designed to combine the advantages of an iron frame or hull with those of a wooden bottom sheathed with copper or zinc. As the bottoms of iron sea-going ships get so foul by the adhesion of shell fish and sea weed as to materially reduce the speed, the protection of the iron becomes a very important consideration. The bottoms of wooden vessels are protected by a sheathing of copper, which by exfoliation sheds or sloughs off such adhesions. The chlorine contained in sea water has a strong affinity for copper, forming a green chloride of copper, which is dissolved by the water, and thus the copper is wasted away. This waste, which constitutes one chief value of copper as a sheathing, can readily be prevented. Chlorine is electro-negative. If the copper sheathing were rendered electro-negative also, the chlorine would be repelled instead of attracted, and the metal would be protected from corrosion. Sir H. Davy proposed to do this by driving zinc nails into the copper. The zinc at once becomes electro-positive, attracts the chlorine to itself, and generates an electrical current which is transferred to the copper; it thus becomes the generating plate of a battery, while the copper becomes the conducting plate. But while chlorine is repelled, lime and magnesia, electro-positives, are attracted to the copper, forming an earthy coating to which shell fish and sea weed readily and firmly adhere. This explanation shows why all the patent applications for the bottoms of iron ships fail to prevent fouling. No artificial coating possessed of the essential property of exfoliation has yet been devised. As any communication, through the medium of salt water, between copper sheathing and an iron hull would generate galvanic action highly destructive to the latter, it becomes necessary to insulate the iron by applying planking to the bottom and then sheathing that; hence we have what are now commonly known as composite ships. With copper sheathing the iron must be perfectly insulated; with zinc this is not necessary, as it decomposes instead of the iron when they are in galvanic communication with each other. The English frigates *Shah* and *Inconstant* are composite. They have a double thickness of wood sheathing outside the iron skin, with copper over all, and brass stems and stern posts. A sheathing of three-inch teak is first laid fore and aft and bolted to the shell of the ship; next comes a layer of planking of the same thickness, but of lighter wood, secured with shifting butts and seams to the first by brass wood screws. The wood sheathing is calked, paid with pitch, and then coppered. The composite system will be adopted in the new monitors now (1875) in course of construction in this country.—*Ship Building*. Few if any mechanical operations demand such a variety

of considerations as the building of a ship. A hollow shell is to be constructed in which lightness and stability are the first requisites. If the vessel be a man-of-war, it is a nice point to determine her displacement, or the entire weight of the structure itself with all that she carries of spars, armament, men, supplies, &c., that from this her depth in the water may be known, and the line of her lower ports be fixed so high as not to be washed into in time of action. The form is to be specially suited for easy and rapid progress, and at the same time must be adapted to resist the severest strains, caused not merely by the weight of the structure and of its load, but by the shock of the waves, and their constantly varying figure, the effect of which is to continually change the places of support, and throw large portions of the weight first upon one point and then upon another. It has often been observed that after a vessel has left the stocks upon which she was put together, and lies upon still water, a line that had previously been drawn straight along her top side from stem to stern is deflected several inches by the settling of the ends, which is owing to a want of precision and strength in the work to meet the inequality of the weights on the different transverse sections. The effect is to separate to some extent the planks and connecting pieces at the top, and compress those in the bottom of the structure. When the ship enters rough water, she is at one moment supported at the two extremities like a bridge, and the great weight bears down the middle, threatening to bend the whole structure and produce the effect called sagging; the next instant her bow and stern hang unsupported over the great wave which bears up the ship across her centre, and the two ends tend to droop; the latter change of form is called hogging. If the ship was thus affected when first launched, it is obvious that the distortion must increase as she works in a heavy sea, and that her timbers and fastenings must be greatly weakened by the motion. In various other ways the strength of her framing is severely tried. Driven obliquely across the waves, she is lifted high upon their summits, and at any moment is dashed into the trough against the next coming swell, the force of which she receives upon her bow, side, or quarter, with a shock that quivers through every timber. When following too nearly the line of the waves, she is rolled violently from side to side, and the great weight and long purchase of the heavy yards and masts act with fearful power to strain the sides, to which they are fastened by the shrouds and stays. Again, when moving directly across the waves, each end is in turn elevated and depressed. In all these movements the force of the strain is told by the creaking of the timbers. The structure is put to still severer tests when the ship touches an uneven bottom, and the weight is supported by a few points upon a hard un-

yielding surface. Then, beaten by the waves, raised up and dashed down again by them, her frame is most perfect if she is not soon parted and broken up. Indeed, the only vessels ever known to come off from a rocky exposed coast after remaining aground for a considerable time were iron ones, as the *Great Britain*, which lay a whole winter on the coast of Ireland, and the *Vanguard*, which was for several days on a rocky beach. The strength of ships, like that of roofs and bridges of long span, depends on the skilful arrangement and fitting of the timbers, so that they shall take the strains they are to meet to the best advantage, as well as on the bolts and fastenings by which they are held in their places. The keel is the foundation or backbone upon which the whole structure is built up. It receives the great upright timbers of the stem and stern, and those called floor timbers that support the ribs, which give form to the sides. The deck beams at different stages, securely fastened at their ends to opposite ribs, hold these together against any spread of the sides or lateral hogging, and also act as struts to prevent collapsing of the sides. Curvature on the length of the ship is guarded against by the planking on the ribs and that of the decks, the planks being laid longitudinally and strongly bolted down to the timbers. In northern Europe since the middle of the last century a system of trussing has been introduced for greater security in this respect. Three parallel rows of pillars were set up extending from one end of the ship to the other, one row on the keelson, and one each side on timbers laid for the purpose and bolted to the ribs. On the top of the pillars of each row and directly under the lower deck was secured a longitudinal timber like an architrave; and diagonal braces extended from the top of one pillar to the foot of the next in the same row. By such arrangement the stiffness was materially increased, but at the expense of stowage room, and the trussing was not altogether secure of remaining in place in the violent movements of the ship. A much superior method was introduced in 1810 by Sir Robert Seppings, surveyor of the navy, which is known as the diagonal bracing. This was formed of a system of timbers crossing the ribs on the inside of the ship at angles of about 45°, and braced by diagonals or struts. This framing started below at the keelson or horizontal timbers at its side, to which it was strapped down, and terminated above under the horizontal shelf which supported the ends of the cross beams under the lower deck. The shelf was thus braced up and supported; and in large ships the second horizontal shelf was likewise sustained by a continuation of the diagonal bracing above the lower deck. These shelves secured to the sides of the ship are always provided for the support of the deck beams, and serve themselves to stiffen the structure in their action like internal hoops. In place of this method

iron plates or straps are now commonly employed in all important wooden ships for diagonal bracing. Diagonal braces are from $\frac{3}{4}$ to $\frac{1}{2}$ in. thick, and from 3 in. to 5 in. wide, laid at an angle of 45° with the keel. There are two tiers, which cross each other at right angles, and end on a belt of iron above the spar deck, called a head strap, somewhat larger than the diagonal straps. Straps are put either inside or outside of the frame in the merchant service; in the United States navy it is customary to put them inside. As wooden vessels now are not so deep in proportion to their length as in former years, the strength secured by this system of iron strapping is indispensable.—In designing a ship, the old plan, after deciding on her tonnage, is to determine the proper midship section for the proposed capacity, with due reference to the desired speed, degree of stability, &c. The next thing is to plan the horizontal section called the load water section, and then prepare the drawing on a scale of a quarter of an inch to the foot. The three principal draughts are known as the sheer plan, the half breadth plan, and the body plan. The first is a vertical section extending the whole length of the ship, and presenting her full depth, the inclination of her stem and stern, her masts, ports, water lines, and generally whatever belongs to the side of the ship. The water lines are drawn straight and parallel, numbered from stem to stern. The half breadth plan is a horizontal section of half the ship divided lengthwise as seen from above. The several water lines, numbered as in the sheer plan, are dotted in, or drawn in blue ink, and designate the width and horizontal curves of the hull at the different levels. The body plan is a midship section, representing the height and breadth of this portion of the ship; it is divided vertically into halves, that to the left showing the curves and arrangement of the timbers toward the stern, and the other those toward the bow; the heights of the several water lines are also indicated. Instead of these plans, the American ship builder has generally substituted a half model of the vessel built up of thin strips of wood laid horizontally upon each other. These strips represent the parallel water lines, and can be taken apart for any alteration of the plan, or for laying off from them the full size lines upon the floor of the moulding loft. This loft is a large room specially devoted to the preparation of the designs and patterns from which all the timbers are to be shaped. The designs being drawn upon the floor, the plank patterns or moulds are obtained from them, which are of the exact dimensions of one face of the timber, and are furnished with marks that designate the other dimensions. The ship yard is situated by the edge of the water, and sufficiently elevated to secure a proper slope for the completed vessel to slide down the ways. At a convenient distance out of the reach of the tide a row of blocks, 4

ft. or more apart and 3 ft. high, is set in the ground, extending back from the water the proposed length of the ship, and their flat upper surface sloping toward it about 3° from the horizontal. On these blocks the timbers which make the keel are laid, being nicely fitted together by scarfing and secured by bolts. In Europe elm is preferred for the keel, being tough, holding the fastenings well, and long remaining sound under water; but in the United States live oak is commonly used. The latter is the most valuable native timber employed in ship building; but white oak of second growth obtained near the coast in New England is also excellent, and far superior to the same timber brought from the interior. Locust and cedar are strong and durable, and hackmatack is valuable for knees. Chestnut is employed to some extent, and white and yellow pine largely, the latter being the best for decks. It is recommended that the trees be killed by girdling in the beginning of the winter when the sap is down, and left to dry and harden before they are felled. After this the timber should be stored in a dry airy place to season. False keels or shoes are from 4 to 6 in. thick, and fastened to the lower side of the main keel with spikes or short bolts, after the frame bolts, which pass through the frame and the main keel, are clinched. The chief object of the false keel is to save the main keel from injury in case the ship should strike the bottom. Ships are generally built with the stern nearest the water, although sometimes it is more convenient to build and launch sidewise. On the fore end of the keel is erected the stem, on the after end the stern post, with its lower end tenoned into the keel. The frames which cross the keel are formed of floor timbers and futtocks. They are put together while in a horizontal position, with the floor timbers lying across the keel. When all are calked and bolted together the whole frame is canted up by proper purchases, cross pawls preventing it from spreading. The frames thus crossing the keel are called square frames, as they are placed at right angles to the keel; forward and abaft of the square frames are the "cants" or cant frames, so called because they cant toward the round of the bow or stern. The keelson is a longitudinal timber parallel to the keel, and occupying a place on the inside of the frames corresponding to that of the keel on the outside. The spaces between the frames are generally filled in solid with white or live oak timber. The keelson is built in one or more pieces varying with the size of the vessel. After the frames are erected they are regulated so as to stand square with the keel longitudinally and level transversely. Heavy rib bands are attached to the frames on the outside, and secured by heavy shores. The inside of the ship is then prepared for strapping, ceiling, placing and kneeing of beams, laying decks, &c. The outside of the frame is covered with plank

nearly parallel in width and of various thicknesses; the plank or wales above water are the thickest, being in a large ship from $5\frac{1}{2}$ to $7\frac{1}{2}$ in., the bottom plank from $3\frac{1}{4}$ to $4\frac{1}{2}$ in. The lowest tier or strake of planks outside, known as the "garboard strake," meets the keel along an angular recess called a rabbet, which is cut into its side for the purpose of affording to these planks a tight fit along their lower edge. The keel is thus interlocked along its whole line between the planks each side of it. In large ships this lower tier is sometimes of timbers rather than of planks. The other planks are from 3 to 7 in. thick. To obtain the curves required for the planks to fit the bends, these are steamed in tanks, and then are brought into shape by bending them with screws and levers between fixed supports. The inner planking, known as the ceiling, begins near the keelson with what is called the limber strake, extending along the whole bottom of the hold, one on each side the keelson. The narrow space between is for a gutter to collect the drainage water, for delivering it to the pumps. Such a passage is called a limber. The strakes over the heads and heels of the timbers are thicker than elsewhere, to give additional security against their ends being pressed in. As the planking is carried up, the projecting pieces called shelves are set in their places and strongly secured, the deck beams are laid upon them, and the ends of these are fastened with wooden or iron knees of great strength. Under the middle of the beams are placed pillars, starting from the keelson; these prevent the settling of the beams, which are arched upward, and their consequent thrusting outward of the sides instead of tying them to a fixed width. As in the rolling of the ship a powerful strain is exerted to lift the ends of the beams, this is also guarded against by another projecting timber set in the planking directly over the beams. This is called the waterway, and is secured by vertical bolts extending through the beam and shelf, and by horizontal bolts that pass through the frame and outer planking. The planks are fastened to the timbers with treenails (*i. e.*, pins of locust) or with bolts or spikes. Treenails have sometimes been made with a thread cut round them and a square head by which they are seized and screwed into the holes. For the decks yellow pine planks are commonly used, except along the sides of the ship, where a strake of hard wood thicker than the rest of the planks, called the binding strake, is laid for a waterway. In laying the deck planks attention should always be directed not merely to their use as a covering, but also to their action as longitudinal ties for the frame. In some instances decks have been laid diagonally from one side to the other, obviously involving a loss of strength; ships have also been built with three layers of planks for the decks and outer covering, two diagonal layers crossing each other, and a third upper layer running

longitudinally. At the ends of the ship the shelf pieces, waterway planks, and strakes are secured to the beams, and crutches attached to the stern post and to the timbers called breast hooks, that spread out from the stem. The openings left in the deck for hatch and ladder ways necessarily weaken it somewhat, though they are provided with stout framing secured to the beams. The holes for the masts are large enough to receive wedges all around of 3 to 6 in. thickness. For supporting the masts blocks called steps are fastened to the keelson, or for light masts to one of the beams, and into a cavity of these blocks the heel of the mast is set. A great variety of work still remains for the ship carpenter to complete before he can give place to the calker, whose office it is to make the seams of the deck and outer planking water-tight. The bulwarks have to be finished, the pumps placed, the capstan or windlass for raising the anchor, the catheads for suspending it over the sides, &c. Calking consists in driving threads of oakum, rolled up in the hand, into the seams between the planks; and that it may reach to the bottom and make the seam perfectly tight, the planks should be bevelled on the outer edge to present an opening gradually closing toward the bottom. The width of the opening is sometimes increased by driving in an iron wedge-shaped tool, and the oakum is then crowded in with great force by the calking iron. When the seams are filled they are payed over with melted pitch; but a much better material sometimes used is the marine glue, prepared from shell lac and caoutchouc. (See GLUE.) The rudder is sometimes hung before launching, but more frequently afterward. This is made of timbers as thick as the stern post, up and down which it extends, and to which it is suspended by pintals on the rudder fitting into braces on the stern post. The head of the rudder passes up through the stern above the deck, and to this a handle called a tiller is fastened for turning the rudder.—The ship being ready for the launch, two parallel lines of heavy timbers are laid along her length, one on each side, and continued down into the water till sufficient depth is reached for the vessel to float. The fall of the water at low tide affords the opportunity for doing this. The slope of this track, or of the "ways," is about seven eighths of an inch to the foot for large vessels; small vessels require a little more inclination. The timbers are held together by others underneath crossing them, and the frame is kept down by being loaded with stones; this at least is the practice where the sliding ways are not permanent. The top of each timber is well covered with melted tallow, and upon this when cold is added soft soap or oil. On the top along the outer edge a ribbon of hard wood full 5 in. square is fastened down, and braced by a succession of shores extending back on each side against some solid support in the ground; the object of this ribbon is to prevent

any outward deviation of the upper timbers that make the cradle in which the ship is held as the whole slides down together. This second system is loosely piled up under the ship, the lowest portion being timbers smooth and well greased on the under side and laid directly on the ways. Between these timbers, called the bilgeways, and the bottom of the ship over them, the space is filled in partly with blocks of timber and planks, and toward the bow and stern by short shores, called poppets, set up from the bilgeways to the bottom of the ship, their steadiness being secured by stout planks temporarily fastened along the bottom against the heads of the poppets. Near the stem and stern chains are passed across to hold the cradle together. To the front of the timbers of the cradle are fastened ropes that are passed over the bow into the ship, and are intended to hold these when they float away from under the vessel. To bring the weight of the ship upon the cradle after this is fitted under it, long wedges are driven in over the bilgeways from one or both sides of each of them. The shores at the sides of the ship, which had heretofore aided to sustain her, and the blocks beneath the keel, which took the chief portion of the weight, may now be removed, with the exception of a few of the latter under the forward part of the vessel. All this preparatory work is done on the rise of the tide; and when this is at about its height, and two short shores, called dog shores, have been placed, one on each side the vessel, to brace from the ways as a fixed point forward against the bilgeways, and thus hold the cradle with its load from sliding too soon, the fore blocks are split up with wedges and drawn out, letting the whole weight settle down on the ways. At an order the dog shores are knocked down, and the structure begins to move, at first slowly and then with rapidly increasing velocity. In rivers and contracted places the course of the vessel is checked by a hawser made fast on shore, or she is brought up by letting go an anchor. The French have long practised launching vessels without side ways, the weight being entirely supported upon a sliding plank fitted under the keel. A strip of timber is fastened along under the bilge on each side, and a few timbers are laid up in the usual place of the ways, reaching within about half an inch of these strips. It is not expected that they will come in contact except in case of the vessel heeling, when they will serve to prevent her falling over. After the launch the vessel is conducted to the wharf to receive her spars, rigging, and machinery, if a steam vessel, and interior finish; or she may be taken into the dry dock to be sheathed. It is important to protect the bottom of a vessel with a metallic covering, as without this it soon collects an incrustation of marine vegetable and animal bodies, which seriously interferes with their progress through the water, and the timbers are liable to be attacked by

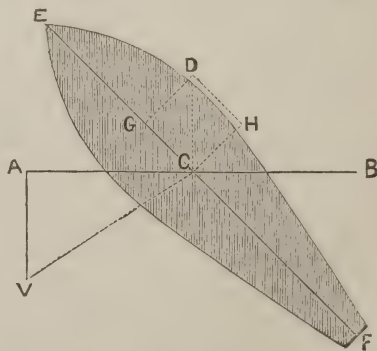
the ship worm. Sheet lead was used in ancient times, and sheet copper was first applied to the ships of the royal navy in 1783. The great expense incurred in suits of copper, which need frequent replacing, is much reduced by the use of Muntz's yellow metal, a combination of copper and zinc described in the article BRASS. The metallic sheets are of different thicknesses for surfaces more or less exposed, the weights being 32, 28, 18, and 16 oz. to the square foot. The thickest sheets are used for the bow and about the load water line. The size of the sheets is 4 ft. by 14 in., and a 120-gun ship would require of them 4,444. They are fastened with copper nails, and are laid so that each sheet laps upon the edge of the next one to it behind and below.—*Masts and Rigging.* The spars include the masts, yards, booms, and gaffs, used to support the rigging and sails. The masts of the smaller vessels are single sticks of pine timber well rounded and with a gentle taper. For large ships it is necessary, on account of the size of the masts, to construct them of a central stick of a number of sides, with longitudinal pieces closely fitted and securely attached to them and then hooped with iron; these are called made masts, and are stronger than the single sticks of the same size. Hollow masts of plate iron are in use, particularly for iron vessels. Rules for the length of the mainmast of a ship have been half the sum of the length of the load water line and the main breadth of the vessel, and also twice the breadth added to the depth. About the head of each of the lower masts are framed timbers making a horizontal scaffolding or platform, which is known as the top. On large ships it is railed around, and on vessels of war it used to be the custom to station men in it during an engagement armed with muskets. Upon the rounded front edge of the top stands the topmast, secured in part by passing above through a strong iron-bound flat block set horizontally upon the upper extremity of the lower mast and called a cap. The topmast is about three fifths the length of the lower mast; and above it succeed in like manner the topgallant mast and royal mast; and in seas where the prevailing winds are light and are felt more aloft, still another mast is added, called the skysail mast. At the head of the topmasts are cross trees in place of the top on the lower masts. Each of these masts carries its own yard, from which depends the square sail designated by the same name as the mast to which it belongs. Its lower corners are sheeted out to the extremities of the yard below, or, in case of the courses or lower sails, to the deck. The yards slide up and down their masts, the lower yards hanging in slings by their middle part, and most of them by lifts attached to the yard-arms, and passing thence through a block at the head of the mast. The foremast is about one tenth shorter than the mainmast, and is furnished with similar yards, rigging, and

sails; those of the two masts are distinguished by the terms main and fore. The mizzen mast of a ship carries no square sail hanging from the mizzen or, as it is commonly called, cross-jack yard, but a mizzen topsail, topgallant sail, and royal. In place of the lower square sail there is a fore-and-aft sail called a spanker, which extends aft from the mast over the taffrail, and is sheeted out to the end of a gaff above and to that of a boom below. This is of great service as a steering sail, acting as it pushes the stern off from the wind to bring the bow up as it is hauled in and kept flat. Similar sails are sometimes attached to the other masts and used for storm sails. The masts are supported by shrouds and stays. The former are strong ropes, each one $2\frac{1}{2}$ times as long as the mast, the head of which it encircles by its middle part. Several of these pairs are thus secured over the head of the mast, and the ends are brought down over the side, diverging as they descend. They terminate outside the ship in blocks called dead-eyes, which connect by a lanyard to others fastened on the outer edge of the channels or chain wales, which are heavy planking secured edgewise to the side of the vessel below the bulwarks. This edge is held down by iron braces bolted below to the futtocks. Though the main object of the shrouds is to hold the masts steady, they also serve as ladders, small ropes called ratlines being hitched across from one to another for steps. The topmast shrouds are set up by dead-eyes secured to the outer edge of the top, and this edge is braced down by iron rods or chains called futtock shrouds attached below to the upper part of the lower mast. The futtock shrouds and those of the topmast have ratlines also, but those for the masts still higher have none. The stays are ropes which support the masts longitudinally, starting generally from their heads, and secured to the foot of the next mast in front, those for the foremast to the bowsprit. The back stays pass from the heads of the topmast directly down to the chain wales, somewhat aft of the foot of the mast to which they belong. The stays that pass from the several masts forward sometimes support triangular fore-and-aft sails, called stay sails. The main and mizzen masts stand nearest together, the former somewhat aft of the centre, and both of them usually are set raking or inclining aft. The foremast stands well forward and upright. The bowsprit extends forward over the bow, rising at an angle of 30° to 33° , its heel resting in a step on the first deck below close to the foremast. A cap is fixed upon the head of it, presenting a round hole above the bowsprit, through which is passed the spar called the jib boom, which is the extension of the bowsprit. As the foremast is stayed forward to the bowsprit, and several fore-and-aft sails, called the foretopmast stay sail, jib, and flying jib, are supported on the stays between them, it is essential

that the bowsprit itself be well secured. This is done first by the bobstay, a very strong rope, sometimes double and triple, which connects the outer portion of the bowsprit with the stem; and by the bowsprit shrouds, which are ropes extending from the end of the bowsprit to the bows. The dolphin striker is a stiff brace or strut extending down from the outer end of the bowsprit; it is kept in place by the jib and flying-jib martingale stays and the back ropes. From the great angle which it forms with the head booms it amply counteracts the lifting effects of the jibs and the strain of the foretopgallant mast. The sails over the head booms are triangular. The rope by which their lower corners are made fast to the deck is called the sheet; this is also the name of the ropes by which the lower corners of the square sails are hauled out to the ends of the yards. Of the courses or lower square sails the corners on the lee side, which in sailing on a wind are hauled aft, are secured by sheets; but the corners on the windward side, which are hauled forward, are made fast to the deck by ropes called tacks. It is with reference to tending these, to shift them as the yard swings in going about, that the preparatory order is given of "Rise tacks and sheets," succeeded, as the evolution is completed, by "Let go and haul." The braces are the ropes by which the yards are swung round. The sail is made to lie still flatter by bowlines which are attached to the leach or edge of the square sails and lead forward. In sailing as close to the wind as possible, the weather bowline is hauled taut, whence the expression "to sail on a bowline," or "on a taut bowline," for lying up close to the wind. In running before the wind the yards are set at right angles to the line of the keel. The head sails are partially becalmed by the after ones, and the fore-and-aft sails over the head booms are of no service; the progress of the ship therefore is not so rapid as with the same wind on the quarter or abeam and filling all the sails. In order to spread a greater surface of canvas when the winds are light and fair, provision is made for lengthening the yardarms by means of booms called studdingsail booms, which are run out through an iron ring on the end of the yard, and to the outer extremity of which are hauled the tacks of the studdingsails. With a side wind these sails are advantageously carried on the weather side. The assemblage of ropes upon a ship, many of which have already been named, are known as the rigging. Those which are fixed, as the shrouds, stays, &c., are called the standing rigging; and the rest, as the halyards, sheets, and tacks, are the running rigging.—*Sails*. The larger sails are made of the heaviest No. 1 flax canvas, while the smaller are formed of lighter varieties running to No. 8 of the same material, known as duck of different degrees of strength. The strips of cloth are sewed together with twine, usually with a double seam,

and the patterns are skilfully cut for a smooth and even fit. The edges are bound around with a rope called a bolt rope to take the strain from the canvas, and in each corner an iron ring or thimble is inserted and held fast by a rope called a cringle, which goes round the outer concave surface of the ring, and is spliced each end into the bolt rope. Through these rings are passed the ropes, called earings, by which the sail is stretched or bent to its place. The same contrivance is repeated at one or two places on the edge of the sail, that it may be shortened in single or double reefing; and on the line horizontally with these earings short lengths of cord, called reef points, are secured through the sail and hang loosely on each side, which are used when the sail is reefed to tie around the part which is taken in. Sails may be classed as square sails and as fore-and-aft sails. The former hang by the earings and rope bands from yards, and are drawn out by the lower corners or clews to the ends of the yards below. They are made to swing round with the yards so as to present their surface to a side wind; but the fore-and-aft sails are better designed for sailing on the wind, and the square sails for running with a free wind. Shoulder-of-mutton sails and gaff topsails are triangular fore-and-aft sails, the foot of which may be attached to a boom, or in the latter case to the gaff, and the top, by which they are hoisted, terminates in a point against the mast. Lateen sails, much used in the Mediterranean, are suspended from a very long yard, which is hoisted by the middle from the deck. One end of the yard is brought down by a brace, and the other projects above the top of the mast, and rakes with it well aft. The sail serves very well as a fore-and-aft sail. The great superiority in the rig of American fore-and-aft vessels, by which they have been able to attain the highest speed of sailing craft, is in the great spread of their sails, their skilful cut, and perfect stretch, which causes them to keep full while their plane is more nearly in a line with the wind than could formerly be practised.—It belongs to the naval architect to determine the amount and disposition of sail which his ship is to carry. The former is proportioned to the immersed midship section, for every square foot of which a well designed ship may carry 35 or even 36 sq. ft. of plain sails, *i. e.*, courses, topsails, topgallant sails, jib, and spanker. Yachts often carry as much as 100 to 1. In regard to the manner of disposing the various sails, it is important that their common centre of effort should be at such a point that the ship when in trim will carry, on a wind, a small weather helm. It has been found that when the pressure of the wind on the sails forward of a perpendicular erected on the centre of load water line, is to the pressure on the sails abaft as .78 to 1, the ship will work well, all other conditions of a good ship being fulfilled.—*The*

Theory of Working Ship. The principle upon which a vessel is made to advance against the wind may be explained as follows: Sustained in a state of equilibrium in the water, she is readily susceptible to any force applied to change her position. This involves a movement of the water to admit her passing through it. On the line of the keel this easily takes place from the wedge-like shape of the hull; but a movement sidewise is resisted by the great body of water pressing against the hull for its full length. Whenever therefore the sails are filled by a breeze blowing against them from behind, even if at a considerable angle with the length of the ship, it is easy to perceive that her motion must be forward on the line of the keel. As the wind draws further forward the sails are braced further round, so that they may still receive it upon their after side. The wind of course strikes them to a greater disadvantage the nearer their plane approaches its direction; but so long as it impinges even obliquely upon their after surface, a portion of the force is exerted to press out the sails in a forward direction, while the remainder passes uselessly along the plain of the sails. The former portion tends to push the ship directly in a course at right angles with this plane; but the shape of the ship being opposed to this movement, this force also is resolved into two, one acting to propel the ship sidewise and the other forward. Thus this last result may prove effective even when the head of the ship is pointed obliquely toward the wind, as mentioned of fore-and-afters, at an angle of 40° or 45° , and in the case of ordinary sailing frigates at an angle of 60° . This may be shown by the annexed figure, where the sail A B, oblique to the line of the keel and to the wind V C, is impelled in the direction C D with a force expressed by the square of the sine of the angle of incidence A C V. If C D represent the



force of the wind on the sail, as expressed by the square of the sine of incidence A V, we have only to construct G H to see that such a direction is composed of the two effects C H and C G with respect to the body E F on which it acts. Now the sharper we brace the

yard A B, the more acute becomes the angle A C E, the effect of which is to augment O H and diminish O G. For as A C E becomes more acute the angle D C H is lessened, so that C D perpendicular to the centre of the yard will approach more to O H perpendicular to the keel E F. Hence a portion of the force is applied in the direction O G, the length of the ship. When braced sharp up, A C E = about 20° . On the other hand, the larger the angle A C E the more the effect O G will increase, in the same proportion as the increase of the sine of that angle when the impulse of the wind upon the sail is the same; for the sines of the angle are in proportion to their opposite sides in the triangle O D G, of which the angle C D G is equal to the angle A C E. Though, when sailing thus partially toward the wind, but a small portion of its propelling effect is available, something is recovered by its greater force caused by running against it; while in sailing in the opposite direction its effect is diminished by running away from it. If, after sailing for any time with the sails sharply braced, the head of the vessel can be brought round, so that the sails shall fill on the other side, the ship will proceed on the other tack on a line reaching further and further to the windward of that before passed over, and thus by a succession of zigzags progress is continually made against the course of the wind. This is called beating to windward, and the turning of the ship toward the wind and thence around is tacking. This is done as follows: The helmsman, having carefully kept the head of the ship as near the wind as practicable with the sails remaining full, at the order puts the helm gradually down, and soon after, at another order, "hard a-lee." As the head of the vessel is thus brought up toward the wind, the head sails are let fly by casting off their sheets, so that they shall present the least impediment in the way of this movement. The spanker on the contrary is hauled more toward the centre, that the wind continuing to strike it may push the stern round the other way. Soon the square sails on the foremast catch aback, or receive the wind on their forward side. This, while it checks the headway, also tends to throw the bow still further round. The after yards are then swung for the wind to strike them on the other side, and the same is next done to the head yards. As the sails fill, the ship soon gathers headway on the new tack. Fore-and-aft rigged vessels are much better adapted for working to windward than those with square sails. Their sails keep full at a smaller angle with the wind, and in going about or tacking they do not lose headway, but even run some distance directly in the eye of the wind, which other vessels are prevented from doing by their great square sails catching aback. As a storm comes up at sea, the first precaution is to shorten sail. The lighter sails are taken in and furled, and the topsails are first single-reefed, and next double-reefed;

mainsail is reefed; mizzen topsail close-reefed; next the fore and main topsail the same; mainsail is then furled, and the jib also. The foresail is then reefed and the mizzen topsail is furled. The main spencer may now be set, and the fore topsail furled unless the ship is too stiff. With close-reefed main topsail and reefed foresail, with the main spencer and stay sails, the ship is now under good sail for either running or lying to. With increasing wind and the ship lying to, the foresail may be taken in. When the main topsail is taken in, the last resort is setting tarpaulins in the weather mizzen rigging of the ship. The practice is somewhat varied with different ships according to their manner of working. In case the vessel does not lie to well, she may in a favorable lull of the storm be put before the wind, and run off under bare poles. An expedient sometimes resorted to with good effect is the drag. This may be made of spare spars with an anchor attached to give it a hold on the water. A long stout hawser secured to this and brought in over the weather bow will enable a ship to "cathead" the sea, and, with all sails snugly furled, ride out the heaviest gale. With such resources, ships at sea in good trim with plenty of room usually escape in the severest storms, sometimes indeed with the sails torn, the topmasts carried away, and occasionally with a mizzen mast cut away to ease the vessel, or otherwise dismantled. The great danger is in proximity to land, especially a lee shore.—Cables are made of rope and of iron, the latter being used the most in recent times. They are worked by means of a capstan or kind of windlass which may have a vertical or horizontal axis, and may be turned by hand or by steam. The method of making the different kinds of chain cables is given in the article CABLE. A table showing the comparative sizes of chain cables and anchors which are used together according to the United States navy regulations will be found in the article ANCHOR. The following table gives the navy regulation for the number, size, and length of both hemp and chain cables for ships of the line, frigates, and sloops of the first class:

NAMES OF CABLES.	SHIPS OF THE LINE.								
	THREE DECKS.			TWO DECKS.					
				First class.			Second class.		
	No.	In.	Fath.	No.	In.	Fath.	No.	In.	Fath.
Sheets, hemp..	2	25	120	2	24	120	2	23	120
Sheets, chain..	1	24	180	1	24	180	1	24	180
Bowers, chain.	2	24	180	2	24	180	2	24	180
Stream, hemp.	1	16	120	1	15	120	1	14	120

NAMES OF CABLES.	FRIGATES.						SLOOPS.		
	First class.			Second class.			First class.		
	No.	In.	Fath.	No.	In.	Fath.	No.	In.	Fath.
	No.	In.	Fath.	No.	In.	Fath.	No.	In.	Fath.
Sheets, hemp..	1	22	120	1	21	120	1	17	120
Sheets, chain.	1	14 $\frac{1}{2}$	165	1	14 $\frac{1}{2}$	165	1	14 $\frac{1}{2}$	160
Bowers, chain.	2	14 $\frac{1}{2}$	165	2	14 $\frac{1}{2}$	165	2	14 $\frac{1}{2}$	160
Stream, hemp.	1	18 $\frac{1}{2}$	120	1	12	120	1	11	120

SHIPP, Albert M., an American clergyman, born in Stokes co., N. C., Jan. 15, 1819. He graduated at the university of North Carolina in 1840, and was received into the South Carolina conference in 1841. He became president of Greensboro female college in 1848, professor of history and English literature in the university of North Carolina in 1849, and president of Wofford college, Spartanburg, S. C., in 1859, and was chosen to be professor of church history in the Vanderbilt university, Nashville, Tenn., in 1874. He has been a member of every general conference of the Methodist Episcopal church, South, since 1850.

SHIPPING. The law of shipping, the law of marine insurance, and the law of negotiable paper have a common origin in the custom of merchants. This custom and its authority ascend to a remote antiquity, and the books to which we must refer for it give us the rules of the commercial world during many ages. Many of the present rules and principles of the law of shipping have an earlier origin than anything in the common law, or indeed in any existing system of law. Even the Roman law, in the rubric *de lege Rhodia de jactu* (concerning jettison), quotes and confirms the law of Rhodes, whose commerce flourished at least 1,000 years before the Christian era. In the fragment to which we have alluded, the modern law of jettison, average, and contribution is as distinctly stated as in any recent text book; and in the title *de nautico fœnore*, which, however, like many other rubrics of the *Corpus Juris* relating to shipping, is not traceable to any earlier source than the law of Rome, we have the present rules regulating loans on bottomry and respondentia. Passing over several centuries, we find other still ancient but useful repositories of the customs of merchants and of the maritime law in the *Consolato del mare*, a collection or digest of the principal rules and usages established among commercial nations from the 12th to the 14th century, and in the laws of Oléron and the laws of Wisby, codes of maritime usages promulgated about the 12th or 13th century. Later, *Le guidon*, a book of the 16th century; the *Ordonnance de la marine* of Louis XIV., published in 1681, a work of the highest excellence covering the whole ground of maritime law; Valin's commentaries upon the ordinance; Cleirac's *Us et coutumes de la mer*; and the writings of Roccus and Casaregis, Italian juriconsults of the 17th and 18th centuries, reflect the commercial usages of their respective periods, and are the abundant, authoritative, and often sought sources of the modern law of shipping.—A ship is personal property, a chattel; and unless some positive law interposes, it may be transferred from seller to buyer by the same forms that attend the transfer of chattels of any other description; and in fact it can hardly admit of a doubt that an oral contract suffices to pass the property in a ship, and that no written evidence of the sale is essential to its validity. Still it is

the ancient usage of the maritime law to make a bill of sale or other written instrument the almost inseparable accompaniment and evidence of the sale, and it is convenient and proper that it should continue to be so. But apart from expediency and established usage, written evidence of the sale of a ship is made an essential condition of registration under the laws of the United States. Though the statute does not prevent the property from vesting in a purchaser under a merely oral contract, yet it renders a bill of sale a practically indispensable formality, because registration, of which it is the condition, gives to the ship all its substantial value as an instrument of commerce.—The laws which regulate commerce confer exclusive privileges in the carrying and coasting trade on United States ships. No merchandise may be brought from any foreign country to this except in American vessels, or in vessels belonging to that country of which the merchandise is the product, or from which it can only be or most usually is first shipped for transportation; and no merchandise shall be carried from port to port in the United States by any foreign vessel unless it formed a part of her original cargo. Ships intended for the fishing or coasting trade must, if not registered, be enrolled and licensed. In short, a ship that is neither registered nor enrolled and licensed cannot sail on any voyage with the privilege or protection of a national character or national papers. This national character and the benefit of it can be acquired only by compliance with the registry laws. The ships which may be registered under these laws are those built within the United States and owned wholly by citizens thereof, and those captured and condemned as prizes or adjudged forfeited by violation of law, if owned wholly by citizens of this country. No ship can be registered if an owner or part owner usually resides abroad, although a citizen, unless he be a consul of the United States or an agent for and a partner in a mercantile house established and doing business here; nor if the master be not a citizen of the United States; nor if the owner or a part owner be a naturalized citizen and reside in the country whence he came more than a year, or in any foreign country more than two years, unless he be a consul or public agent of the United States. If a registered American ship be sold or transferred in whole or in part to an alien, the certificate of registry must be delivered up, or the vessel is forfeited. As soon as a registered vessel arrives from a foreign port, her documents must be deposited with the collector of the port of arrival, and the owner, or, if he does not reside in the district, the master must make oath that the register contains the names of all persons who are at that time owners of the ship, and at the same time report any transfer of the ship or of any part that has been made within his knowledge since the registry, and also declare that no foreigner has any interest in the ship. If

a ship be transferred while at sea or abroad, the old register must be given up, and all the requirements of law as to registry must be complied with within three days after her arrival at the home port.—The rights of part owners of ships form an important branch of the law of shipping. Two or more persons may become part owners by building a ship together, or by joining in purchasing it, or each may purchase his share independently of the others; and their rights and obligations are the same in all these cases. A ship may form part of the stock or capital of a co-partnership, and then it will be governed in all respects by the law of partnership. But part owners are not necessarily partners. Any one of them may at any time sell his share, but he cannot sell the share of any other part owner without his authority. A majority of the owners may generally direct the employment of the ship at their discretion; but a court of admiralty will interfere to do justice between them, and prevent any one from inflicting injury on the others. In the absence of the rest, and without prohibition from them, one part owner may, in the exercise of good faith and a sound discretion, manage the ship as for himself and them; and the contracts into which he enters in relation to the employment or preservation of the ship bind all the part owners in favor of an innocent third party. In general, all the part owners are liable *in solido*, or each one for the whole amount, for all the repairs of a ship or for necessities actually supplied to her in good faith; but if it can be clearly shown that especial credit was given and intended to be given to one owner personally to the exclusion of the others, the others cannot be holden. One of the part owners generally acts as ship's husband. His ordinary duty and authority include equipping and repairing the ship, taking care of her while in port, furnishing her with all regular and proper papers, and making contracts for freight or passage. He cannot unless specially empowered make insurance, buy a cargo, borrow money, or surrender the owners' lien on the cargo for freight.—The owner of a ship may employ it in carrying his own goods or those of another. He may carry the goods of others while he himself retains the possession and direction of the ship, or he may lease it to others. In one case, he carries goods on freight; in the other, he lets his ship by charter party. When goods are carried on freight, the rights and obligations of ship owner and shipper are stated generally in the bill of lading, which is now in universal use among commercial nations with but little variety of form. It should contain the names of the consignor and consignee of the vessel, of the master, of the places of departure and destination; also the price to be paid as freight, with primage and other charges if any there be; and either in the body of the bill or in the margin the marks and numbers of the things shipped.

The bill should be signed by the master of the ship, who by the strict maritime law has no authority to sign a bill of lading until the goods are actually on board. One copy of the bill of lading is usually retained by the master, and three copies are given to the consignor; of these he retains one, and the others he sends to the consignee, one of them with the goods and the other by some other conveyance. The bill promises delivery to the consignee or his assigns. The consignee may designate his assigns by a particular indorsement, or he may indorse the bill in blank. As the bill is evidence against the ship owner as to the reception of the goods, and their quantity and quality, it is common to say: "Contents unknown." Yet between the ship owner and the shipper the bill is not conclusive, and the former may show that the goods were injured or destroyed on the passage by reason of some intrinsic defect, which was not apparent or easily to be ascertained when the goods were shipped. But if the bill has altered the situation of parties relying on its truth, so that either an innocent party must suffer or else the ship owner whose agent signed the bill either fraudulently or heedlessly, it is he and not the innocent party who must bear the loss.—The contract of affreightment is entire; therefore no freight is earned unless the whole is earned by carrying the goods quite to their destination. If the transportation is incomplete, having been interrupted by wreck or other cause, there is no absolute right of freight. Yet there is a conditional right; for as soon as the ship receives the goods, it not only comes under the obligation of carrying them to their destination, but at the same time, or perhaps more exactly, on breaking ground and beginning the voyage, acquires the right of so carrying them. Therefore, if any interruption intervene, the ship owner has the right of transshipping the goods and carrying them on to their original destination. The goods are to be delivered by the bill of lading in good condition excepting "the dangers of the seas," and such other risks or perils as may be expressed. Damage caused to goods by an excepted risk is therefore the loss of the shipper or consignor, and not the loss of the owner. But if goods are lost in substance, even if not in form, as if sugar is washed out of boxes or hogsheds, or wine leaks out of casks by reason of injury sustained from a peril of the sea, though the master may deliver the hogsheds or casks, this is not a delivery of the sugar or of the wine, and no freight is due. But freight must be paid if the goods are injured or actually perish and disappear from any internal defect or decay or change; that is, from causes inherent in the goods themselves. If goods are delivered, although damaged and deteriorated from faults for which the ship owner is responsible, as bad stowage, deviation, negligent navigation, or the like, freight is due, the amount of the damage being first deducted. The rules in respect to passage money are quite

analogous to those which regulate the payment of freight; but as the money is not earned except by carrying the passenger, or *pro rata* by carrying him a part of the way with his consent, it may be recovered back when it has been paid, as it usually is, in advance, and not earned. Not only is the owner of the ship bound to the owner of the cargo, as soon as he receives it, to lade it properly, to take care of it while on board, to carry it safely, so far as the seaworthiness of the ship is concerned, to its destined port, and then deliver it all in a proper way, but the ship itself is bound to the discharge of these duties.—An owner, we have said, may let his ship to others. The instrument which contains the evidence of such a contract is called a charter party, an ancient name, the origin of which is not quite certain. The form of the instrument varies with the bargain between the parties. Generally only the burden of the ship is let, the owner holding possession of her, finding and paying master and crew, supplies and repairs, and navigating her as is agreed upon. Sometimes, however, the owner lets his ship as he might let a house, and the hirer takes possession, mans, navigates, supplies, and even repairs her. The charter party should designate particularly the ship and master and the parties; should describe the ship generally and particularly as to her tonnage and capacity; should designate especially what parts of the ship are let, and what parts if any are reserved to the owner or to the master to carry goods, or for the purpose of navigation; should describe the voyage or the period of time for which the ship is hired with proper particularity; and should set forth the lay days, the demurrage, the obligations upon either party in respect to the navigation or furnishing of the ship, and all the other particulars of the bargain. Lay days are those which are allowed the charterer for loading or unloading the vessel. If more time than these agreed lay days is occupied, it must be paid for, and the amount thus paid is called demurrage. By the charter party the hirer (or charterer) usually agrees to pay so much demurrage a day. If time be occupied in repairs of the ship which are made necessary without the fault of the owner or master or of the ship itself, that is, if they do not arise from her original unseaworthiness, the charterer pays during this time. But generally speaking, there is no claim for demurrage on the charterer for any delay which is induced by the action of the elements, as ice, tide, or tempest, or from any act of government, or from any real disability of the consignee which could not be imputed to his own act or to his own wrongful neglect. The contract of charter party may be dissolved by the parties by mutual consent, or without their consent by any circumstance which renders the contract illegal; as for example, a declaration of war, an embargo, or a blockade.—In the navigation of the ship, the whole care and supreme command are intrust-

ed to the master. He must see to everything that respects her condition, including her repairs, supplies, loading, and unloading. He is principally the agent of the owner, but is to a certain extent the agent of the shipper and of the insurer, and of all who are interested in the property under his charge. Much of his authority as agent of the owner springs from necessity. In a case of extreme necessity, he may even sell the ship; he may pledge her for a debt by a bottomry bond; he may charter her for a voyage or a term of time; and may raise money for repairs or incur a debt therefor, and make his owners liable. Generally the master has nothing to do with the cargo between the lading and the delivery; but if the necessity arises, he may sell the cargo or a part of it at an intermediate port if he cannot carry it or transmit it, and it must perish before he can receive specific orders. So he may sell it or a part of it, or pledge it by means of a respondentia bond, in order to raise money for the common benefit. A bond of respondentia is much the same thing as to the cargo that bottomry is as to the ship. It secures money borrowed at maritime interest and on maritime risk by pledge of the goods, and the debt is discharged when the goods perish. The owner is liable for the master's wrong doings; that is, for every injury done by the master while acting in that capacity.—Under our pilotage laws, every ship entering or leaving a harbor must, within certain limits, accept the services of a pilot if they are offered, or pay the prescribed fees even if those services are declined; and if a ship neglect to take a pilot when it should and can do so, the owners will be answerable in damages to shippers or others for any loss which may be caused by such neglect or refusal. As soon as the pilot stands on deck he has control of the ship, and is answerable for any damage resulting from his own negligence or default. Yet it remains the master's duty and power, in case of obvious and certain disability, or dangerous ignorance or error, to disobey the pilot and dispossess him of his authority.—See also AVERAGE, BOTTOMRY, SALVAGE, SEAMAN, and STOPPAGE IN TRANSITU.

SHIP WORM, or *Pile Worm*, the popular name of the bivalve shells of the family *pholadidae* and genus *teredo* (Linn.), so called from their perforating ship and other timber. The shell is thick, short, globular, equal-valved, widely open in front and behind, lodged at the larger or inner extremity of a cylindrical tube, straight or sinuous, partly or entirely lined with white calcareous matter, and often open at both ends. The valves are reduced to mere appendages of the foot; in the centre of their circular opening this organ is protruded, the whole forming a very effectual boring apparatus, which is indicated by their peculiar shape, strength, arrangement of the valvular ridges, and great size of the adductor muscle. The animal is elongated and worm-like, the length

being due chiefly to the prolongation backward of each respiratory tube, the siphons of which are provided with two calcareous triangular flattened plates, the *palettes*, which are always turned to the external aperture. The best known species is the *teredo navalis* (Linn.), whose calcareous tubes are from 1 to $2\frac{1}{2}$ ft. long. They attack wood immersed in sea water, boring in the direction of the grain, and turning out only for a hard knot, or a companion whose presence they detect by the sense of hearing; the dust of the rasped wood is introduced by the foot into the cavity of the mantle and swallowed, and is usually found filling the long intestine. They are ovoviviparous, and the young after leaving the body of the mother have a smooth bivalve shell, swim by means of long vibratile cilia, and creep by the tongue-shaped foot; they soon attach themselves to wood and begin to bore, secreting the calcareous tube as they go along; they grow in the wood and enter it when young, as is evident from the external aperture being too small to admit the body of the enclosed adult. From the tropical seas they have been introduced into the temperate waters of Europe and America, and in many places have been exceedingly destructive. The best protection has been found to be metal sheathing and broad-headed nails; and in some cases kyanizing or otherwise poisoning the timber has prevented their attacks. Other species have been found whose tubes extend from 3 to 6 ft., with walls $\frac{1}{8}$ to $\frac{1}{2}$ in. thick, and some-

perforates floating wood. The perforations are generally for a few feet below low-water mark, and in preference in the direction of the grain between the annual rings; and their



Wood Perforated by Ship Worm.

numbers are so great that by the time one has perforated an inch the timber is riddled. They are common on both sides of the Atlantic, and are everywhere destructive. They may be guarded against in the same manner as the *teredo*. These creatures have their uses in disintegrating sunken vessels and substances which would obstruct navigable channels.

SHIRAZ, a city of Persia, capital of Faristan, in a beautiful and well cultivated plain, about 4,750 ft. above the sea, 217 m. S. by E. of Ispahan, and 115 m. E. N. E. of Bushire; pop. about 40,000. There are few other Persian cities so substantial in construction, or so attractive in appearance and surroundings. The

walls are nearly 4 m. in circumference, and the buildings within are constructed principally of stone and a mixture of sun-dried and kiln-dried bricks. Among the finest are the citadel, the mosques sur-



Ship Worm (*Teredo navalis*).

times diverging into two; one burrows in the husks of cocoanuts and other woody tropical fruits floating on the ocean, making very crooked channels. For details see the abstract of a paper read before the national institute at Washington, D. C., by James Jarvis, giving the results of his experiments since 1849 on various kinds of timber, in the "Annual of Scientific Discovery" for 1857, p. 359.—Another pile or timber worm is a minute sessile-eyed crustacean, of the order *isopoda*, and genus *limnoria* (Leach). The best known species is the *L. terebrans* (Leach), $\frac{1}{8}$ to $\frac{1}{2}$ in. long, rounded at each end, with sides parallel; there are 14 segments, the last two much the largest, the seven next to the head each bearing a pair of short legs; there are two pairs of jaws and a pair of strong mandibles, which are the boring organs; the general color is olive-gray. It can swim as well as creep. All wooden structures immersed in salt water are attacked by it, especially sea bulwarks, and the piles and piers of bridges, docks, and canals; it rarely

mounted with domes of green and blue, the bazaars, and the largest of the ten colleges. Considerable portions of Shiraz are ruined and dilapidated. The adjoining plain is exceedingly fertile, abounding in fruits and flowers, and the rose gardens of the suburbs are celebrated throughout the world. The position of Shiraz on the trade route between Ispahan and the Persian gulf makes it a place of considerable commercial importance; and it is a station of the Indo-European telegraph. In addition to rose water, wine of a very fair quality resembling Madeira, and tobacco of remarkable fragrance, are the chief industrial products of vegetable origin. Glass bottles and sword cutlery are manufactured. It has a mint, and its lapidaries are renowned for their skill.—Shiraz was founded in the 7th century, captured by Tamerlane in 1387, and made the capital of Persia by Kerim Khan in 1760, who greatly enriched and beautified the city. It was visited by severe earthquakes in 1812, 1824, and 1853, the last one being very destruc-

tive. It is famous among Persians as the birth-place and residence of the poets Saadi and Hafiz, both of whose tombs are in the neighborhood. There are numerous antiquities in the vicinity, including the ruins of Persepolis.

SHIRE. See COUNTY.

SHIRÉ, a river of S. E. Africa, which flows out of the S. extremity of Lake Nyassa, and after a southerly course of about 300 m. falls into the Zambesi, 90 m. above its mouth. A series of rapids, about 40 m. long, terminating 100 m. from the Zambesi, separates the upper from the lower valley of the Shiré, by a descent of 1,200 ft. Except in these cataracts the river is navigable for boats, being nearly 150 yards wide and from 12 to 15 ft. deep at its point of exit from the lake, while it enters the Zambesi with a width of 200 yards. Its upper course is broad and deep, and one day's march S. of Nyassa it expands into a lake 10 m. long and 5 m. wide, known as Pamalombe. Below the rapids the river flows over great shallows, and through marshes choked with aquatic vegetation. The Shiré was first explored in 1859 by Livingstone.

SHIRLAW, Walter. See supplement.

SHIRLEY, James, an English dramatist, born in London about 1594, died Oct. 29, 1666. He graduated at Catharine hall, Cambridge, took orders, and was appointed to a living in Hertfordshire, which he soon resigned, having become a Roman Catholic. After teaching a few years in the grammar school of St. Albans, he settled about 1625 in London as a writer for the stage. He had produced 33 plays when parliament in 1642 prohibited theatrical performances. He fought in the civil wars under the earl of Newcastle, and afterward resumed teaching. The great fire of London drove him and his wife into the suburbs, where from exposure they died on the same day and were buried in the same grave. He published five grammatical treatises, assisted in the composition of several plays published by his patron Newcastle, and wrote the notes for Ogilby's translations of Virgil and Homer. His "Traitor," partly recast by Sheil, was produced at Covent Garden theatre in 1819, under the title of "Evadne, or the Statue." The only collection of his works is that of Gifford and Dyce (6 vols. 8vo, London, 1833).

SHIRWA, a lake in S. E. Africa, 30 m. S. by E. of Lake Nyassa, and separated from the valley of the Shiré river to the west by a mountain ridge having an estimated elevation of 7,000 ft. It is 60 m. long from N. to S., 20 m. wide, and about 2,000 ft. above the sea level, with brackish waters and no known outlet. It was discovered by Livingstone, April 18, 1859.

SHOA, one of the great political divisions of Abyssinia, in the S. E. corner of that country, sometimes under the same sovereignty and at others an independent state, situated between lat. 8° 30' and 11° N., and lon. 38° and 40° 30' E. Its boundaries are ill defined, but it is bordered N. W. by Amhara, N. E. by

Adal, E. by the Galla desert country, S. by the river Hawash, and terminates on the W. in the valley of the Abai; pop. estimated at 2,500,000, of whom 1,000,000 are Coptic Christians and the remainder Mohammedans and pagans. Shoa consists of a series of plateaus, varying from 3,000 to 10,000 ft. in height above the level of the sea. A mountain range traverses the country from S. W. to N. E., forming an eastern watershed down which flow the affluents of the Hawash, while the western slope gives rise to the Jamma, one of the principal tributaries of the Abai. The valley of this river occupies the central and western part of Shoa, at an elevation of about 3,000 ft. A broad plain lies between the mountains and the Hawash river on the south, and from the highlands the descent is rapid through the eastern part of the country, called Efat, to the desert. Shoa is watered by numerous streams; the soil is fertile, and large crops of grain are raised. The higher lands are used chiefly for pasturage. The valleys are very beautiful and well wooded, but in summer they are hot and unhealthy, and particularly subject to fever. They produce coffee, cotton, drugs, and different sorts of dye woods. Ancient volcanic rocks predominate in the geology of Shoa. Iron and sulphur are the chief mineral products, and coal is said to exist. It has but little external trade, and its foreign commerce is carried on principally through ports on the gulf of Aden. There is a caravan route from Ankobar to Tajurrah, on the gulf of that name, but the difficulty of transporting goods across the desert is very great. Gold dust, spices, gums, ostrich feathers, and ivory are the chief exports, but some of these articles merely pass through the country from the surrounding territories. Cotton cloth is manufactured, and the natives work in iron. Ankobar, the capital, is situated on the eastern highlands, near the mountain range already mentioned, in lat. 9° 35' N., lon. 39° 54' E., 8,198 ft. above the sea, and enjoys a climate of perpetual spring; pop. about 10,000.—Shoa has frequently been a province of the Abyssinian monarchy, but is now an independent kingdom. The British government established friendly relations with the country in 1841, through a diplomatic mission under Major Harris. The government is an absolute despotism, and the name of the present king (1875) is Menelek.

SHODDY, a rag wool obtained from old blankets, stockings, carpets, flannels, &c., and now largely employed together with the similar article called mungo, obtained from old woollen garments and tailors' clippings, in mixing with new wool for manufacturing blankets, druggets, carpets, table covers, pilot cloths, petershams, &c. In some of these rag wool constitutes nine tenths of the whole material, and in others not more than one tenth. Its use in some degree is the cause of the apparent cheapening of many kinds of woollen goods within a few

years. In some parts of England the business of working up woollen rags is very extensive. About one third of the whole amount is produced at Batley, Yorkshire, and the remainder in neighboring towns. The rags pass through a number of hands in the course of preparation for the powerful machines employed in tearing them to fibres. In the United States shoddy has become a manufacture of considerable importance, and the article is also imported from England. The manufacture in Germany is also extensive. Its presence is detected in wearing garments by the collection of rolls of short wool between the cloth and the lining. Unless the admixture is excessive, the wear of the cloth is not materially affected.

SHOE, a covering for the foot, commonly made of leather. If furnished with a top for enclosing the lower part of the leg, it is called



FIG. 1.—Sandals. 1. Foot of Statue of Elpis, in the Vatican. 2. Female Foot with simple Sandal. 3. Foot of Apollo Belvedere.

a boot. The oldest form is that of the sandal, a flat sole to be worn under the foot, and secured to it by thongs in various ways, as shown in the accompanying illustration. The ancient Egyptians made sandals of leather, and others for the priests of palm leaves and papyrus. Specimens from their tombs are preserved in the British museum, formed of strips of palm leaf nicely fitted together and furnished with bands of the stem of the papyrus. The Hebrews used similar protections for the feet, sometimes formed of linen and of wood, while those for soldiers were of brass or iron. Among the ancient Greeks and Romans the use of shoes was not general. Spartan youths were trained to go barefoot, and the heroes of



FIG. 2.—Shoes. 1. From an Antique Statue. 2. Foot of the Statue of Hermes in the Vatican. 3. From a Statue of Demosthenes in the Vatican.

Homer are usually described as without shoes when armed for battle. Greek women, however, wore shoes, and their use finally became universal. There was great diversity in their fashion, and the several sorts were named from the person who introduced them or from the place whence they came; as the "shoes of Alcibiades," "Persian," "Cretan," "Athenian shoes," &c. The Spartans wore red shoes, and the same were put on by the chief magistrates of Rome on ceremonial occasions. The *calce-*

us was like modern shoes in form, covering the whole foot, and tied with lachets or strings. Those of senators and patricians were high like buskins, ornamented with an ivory crescent, and called *calcei lunati*. Some were made with tops, and of all lengths, even to covering the whole leg; these were called *calceamenta* and *cothurni*. The tops were often of the skins of wild animals, lacing up in front, and ornamented at the upper extremity with the paws and heads arranged in a flap that turned over. The skin was dyed purple or some other bright color, and the shoes were variously ornamented with imitations of jewels, and sometimes with cameos. It was common to make them open at the toe, so that this part of the foot was left exposed.—Wooden shoes were in common use throughout Europe in the 9th and 10th centuries, and were worn even by the first princes; but sometimes highly ornamented leather sandals or shoes were worn. Great attention was directed in the middle ages to this portion of the dress, as well as to



FIG. 3.—Shoe and Boot. 1. Shoe, from an Antique Statue. 2. Hunting Boot, from a Statue of Diana.



FIG. 4.—Shoe of Charlemagne, Abbey of St. Denis.

the covering for the head (see **HAT**), and equal extravagances were adopted in both articles. The shoes were worn of different colors, and the stockings also were unlike each other, and of different colors from either of the shoes. In the reign of William Rufus a famous beau, Robert, surnamed the Horned, introduced shoes



FIG. 5.—1. From a Portrait of the Emperor Frederick III. 2. Italian Shoe of the 14th Century.

with long-pointed toes twisted like a ram's horn. Though strongly inveighed against, the style became fashionable, and in the reign of

Richard II. the points had increased to such an extent that they reached the knee, to which they were secured by chains of silver or gold. The upper parts were cut to imitate the windows of a church, and the whole was made extravagantly conspicuous. For three centuries the clergy, popes, and public officers sought in vain by declamations, bulls, and orders to break up the fashion. By act of parliament in 1463 shoemakers were prohibited from making for the "unprivileged classes" any shoes with points more than 2 in. long; and afterward excommunication was denounced against any person wearing such. The extravagant taste was then directed to the width of the toe, till at last Queen Mary was impelled to restrict this by proclamation to 6 in. In the 16th century shoes were made of elegant buff-colored Spanish leather, with tops of enormous dimensions spreading over so widely as to obstruct the movement of the feet. The Puritans wore such boot tops, and after the restoration of Charles II. the French custom was introduced of ornamenting the upper edge with lace. The present simple form of shoe was adopted in the early part of the 17th century, and in the latter portion of the same the shoe buckle began to be used. During the succeeding century this continued to be very conspicuous, and so many were dependent upon its manufacture in England that, when it began to be unfashionable in the commencement of the present century, the prince of Wales sought to keep up the custom for the sake of the buckle makers. Shoes worn by ladies in the last century were sometimes very elaborate and costly, made of bright-colored silk, ornamented with gold or silver stars and binding of different colored silks from the shoe itself. Of all the diversities of shoes worn by various nations, none are so strange and unnatural as the slippers of the Chinese ladies of rank. From childhood the growth of their feet is checked by bandages at the cost of extreme suffering. They are thus enabled to wear shoes only 3 or 4 in. long, which are most unquestionable evidences of their high rank. The shoes are of silk beautifully embroidered with designs in gold and silver thread and colored silks. In European countries wooden shoes (Fr. *sabots*) are in very general use among the peasantry; they are cheap and durable, and, though clumsy, are said to be comfortable. In this country an attempt to manufacture wooden shoes was made on a large scale in 1863, but the market was found to be limited, and very few are now made.—In the manufacture of shoes the highest perfection has been attained in the United States, due chiefly to the ingenuity and enterprise of the mechanics of Massachusetts. In Lynn the making of women's shoes had been a prominent industry almost from its first settlement. The business was conducted by the families of the manufacturers, and with no especial skill until the settlement there in 1750 of a Welsh shoemaker named John Adam

Dagyr. By his superior workmanship he acquired great fame in the trade, and materially improved the style of the work in that region. During the revolutionary war Massachusetts supplied great quantities of shoes for the army; but soon after its close the business was seriously checked by large importations. In Lynn however it revived, so that in 1788 its exports of women's shoes were 100,000 pairs. In 1795 200 master workmen were employed there, besides 600 journeymen and apprentices; and about 300,000 pairs of shoes were sent away, chiefly to southern markets. From the cities some were exported to Europe, and also direct from Lynn. The business continued steadily to increase, until it amounted in 1874 to a production estimated at about 11,000,000 pairs, of the total value of \$14,000,000, and giving employment in the busy seasons to more than 10,000 operatives. The work is not continuous, there being about three months of the year when most of the operatives are idle or engaged in other pursuits. The shoes produced in Lynn are nearly all for women, misses, and children, the uppers of which are largely of lasting or serge, though a considerable quantity are of morocco, kid, and grain leather. Men's shoes are also made to some extent of calf and serge. Lynn work is distinctively known in the trade as embracing all the lighter grades to be found in the ordinary retail shoe stores, and it is made to sell at the lowest prices for which a light and cheap shoe can be produced. It is all "sewed" work, and for the greater part the bottoms are put on by the McKay machine, which sews through the outsole, insole, and upper. All those not so bottomed are known as "turns," or shoes in the making of which the sole is attached with the shoe wrong side out, after which it is turned and lasted in finishing. A large portion of these shoes are made by hand, the work being done out of the shops in families in Lynn and vicinity; but there are two well known machines, the Goodyear and the McKay, for sewing bottoms on "turn" shoes. Next in importance to Lynn, among the shoe manufacturing towns of Massachusetts, is Haverhill, where a generally better quality of shoes is made, including both sewed and pegged work of every kind. Next come Marblehead, Worcester, Marlboro, Milford, the Abingtons, Spencer, the Bridgewater, Brockton, the Weymouths, North and South Braintree, Brookfield, Beverly, Medway, Randolph, Stoughton, Danvers, Quincy, and several other places. In Maine and New Hampshire there is also an important shoe manufacturing industry, which is principally carried on at Portland, Auburn, and Lewiston, Me., and at Dover and Farmington, N. H. The business of buying the materials which enter into these goods and selling the productions is nearly all done in Boston, whose merchants are the principal owners of all the largest factories. There are no returns by which the exact production

can be definitely ascertained; but about three fourths of the goods made in the shoe towns of eastern Massachusetts, as well as some from Maine and New Hampshire, are shipped from Boston, and these shipments have been as follows for 10 years: 1865, 720,000 cases; 1866, 820,000; 1867, 920,000; 1868, 1,010,000; 1869, 1,340,000; 1870, 1,260,000; 1871, 1,310,000; 1872, 1,450,000; 1873, 1,340,000; 1874, 1,375,000. A case of women's or children's shoes regularly contains 60 pairs, and of men's boots 12 pairs are packed to a case; it is therefore probably below rather than above the actual amount to estimate the total shipments from Boston to places outside of New England for the year 1874 at 55,000,000 pairs. There is a very wide difference in the prices, as the goods comprise everything from a carpet slipper to a farmer's brogan, from a gentleman's fine calfskin boot to a miner's iron-clad shoe. But on an average they sell for about \$45 a case, making a total for the reported shipments for 1874 from Boston of \$61,875,000. By a careful estimate, the value of the boots and shoes made in Massachusetts and the shoe towns of Maine and New Hampshire is placed at \$100,000,000 per annum. While Boston is the leading wholesale shoe market of the United States, New York is entitled to the next place in importance as the distributing point for a great portion of the country, and for the manufacture of what are known as fine goods. Its work is the very best made in the country, and surpasses any factory-made boots and shoes in the world. In these goods only the best grades of French and German calf and kid skins, and the best morocco of domestic manufacture, with oak-tanned sole leather, are used. The work for ladies, misses, and children is nearly all machine-sewed, but of the best men's work a large proportion is made by hand. The production in the city of New York in 1874 amounted to about 3,000,000 pairs, of an estimated value of \$10,000,000. Next to New York may be classed Philadelphia, after which come Baltimore, Chicago, Cincinnati, St. Louis, and many smaller places throughout the Union. The imports of boots and shoes into the United States are insignificant, those entered at New York for 1874 having an aggregate value of only \$41,270. The exports for the same year from New York were \$202,593, almost entirely to the West Indies and Central America. The total exports from the United States for 1874 were 302,218 pairs, valued at \$448,138; for 1873, 215,308 pairs, valued at \$351,318.—Excepting possibly England, no other country in the world is so generally supplied with factory-made shoes as the United States. Throughout Europe the cobbler and the journeyman shoemaker still do a large part of the business. In England the factory system, with very much the same machinery and a similar division of labor as in the United States, supplies by far the greater part of the shoes called for by the

British home trade, and its vast demand for export to all quarters of the globe. The manufacture of boots and shoes in England is principally carried on at Leeds and in its vicinity, in the northern part of the kingdom, and at Northampton, as well as in the city of London.—It would require a volume to give a full list of all the boot and shoe machinery made, with even brief mention of the uses of the different kinds. The pegging machine, one of the most important, is principally due to Alpheus C. Gallahue, to whom were granted six different patents, the first in 1851. Elmer Townsend and B. F. Sturtevant, of Boston, largely aided in perfecting the invention of Gallahue; but it was not until about 1858-'60 that it came to be generally introduced. There were 1,700 pegging machines in operation in the United States in 1873. A machine is capable of pegging two pairs of women's shoes in a minute, and will put in one, two, or three rows of pegs at once, as may be required. The pegs are cut, by the working of the machine, from ribbon-like strips of white birch, which are supplied in rolls of from 75 to 150 ft. in length. About 1,000 cords of wood are required yearly for the manufacture of pegs in this country, but large quantities are regularly exported. Of equal importance with the pegging machine is the McKay sole-sewing machine, known in England and on the continent of Europe as the "Blake" machine. It was invented about 1858 by Lyman R. Blake, but was perfected and introduced into use by Gordon McKay. By this machine the soles can be sewed on nearly 100 pairs of women's shoes in an hour, and 800 pairs in a day of ten hours is fair work for an experienced operator. A royalty payable in stamps is required on all goods made on this machine, as follows: on slippers and misses' and youths' shoes, 1 ct. a pair; women's and boys' shoes, 2 cts.; men's boots, 3 cts. The income of the McKay machine association from the sale of stamps has been as follows: 1863, \$38,746 51; 1864, \$99,157 63; 1865, \$150,776 15; 1866, \$181,404 97; 1867, \$210,225 36; 1868, \$286,011 93; 1869, \$356,026 06; 1870, \$400,011 08; 1871, \$486,083 09; 1872, \$564,501 22; 1873, \$529,973 81. This machine is in such general use that a statement of the number of machines employed in different localities will give a very fair general idea of the distribution of the manufacture. In 1874 there were 1,200 of them in use in the United States, over 400 in England, and about 100 on the continent of Europe. Of those in the United States, 180 were employed in Lynn, 50 in Haverhill, 300 in the state of Massachusetts outside of these two places, 180 in the other New England states, 100 in New York, 90 in Philadelphia, 150 in the western states, and 130 in the southern. There are two other kinds of sole-sewing machines, viz.: the Goodyear welt machine, which makes a shoe in almost perfect imitation of hand work, and the Goodyear and McKay machines for making "turns."

For stitching the uppers of shoes several machines are in use, chief among which, both in this country and in Europe, are the Elias Howe and the Wheeler and Wilson. Next in importance to the pegging and sewing machines should be ranked cable-screw wire and wire-tacking machines, which have come into extensive use within a few years. After these come machines for setting and burnishing the edges of the soles, for making and trimming heels, for forming and beating out the sole, as well as for cutting it out, for rolling and splitting the leather, for sandpapering, eyelet making, &c. These machines, together with scores of less importance, are all of American invention, and most of them have been adopted in the shoe factories in other parts of the world. The attempt to introduce machinery on a large scale was first made in England, where in 1809 a patent was granted to David Mead Randolph for a method of riveting soles and heels to the uppers instead of sewing them together. He used a last sheathed on the bottom with an iron or steel plate. On this plate he laid the inner sole, and brought the edges of the upper leather around, and temporarily fastened them. The outer sole was then applied and secured by small nails driven through the three thicknesses and clinched against the plate. The first large manufactory with machines for expediting the operation was established in Battersea, by Brunel, the famous engineer, and it was carried on by the invalid soldiers of Chelsea hospital for supplying shoes to the British army. The shoes were made with a welt riveted to the edge of the outer sole by small nails, and a row of longer nails outside of these secured the whole to the uppers and inner sole. The bottoms were studied with short nails of copper or iron to improve the wear. Several ingenious machines, worked mostly by treadles, or otherwise by a winch turned by hand, were devised by Brunel for the various processes, as cutting out the leather, hardening it by rolling, punching the holes for the nails, forming the nails from slips of metal and inserting them in the holes, both by one machine, and for the others connected with the securing of the parts together. The machines do not appear to have continued in use after 1815, when on the establishment of peace the demand for army shoes fell off, and manual labor being more abundant the machines were of less importance. It was not until English manufacturers had generally adopted the American factory system and American machinery, that any large portion of the total production was supplied by the use of machinery. The wooden peg, now used for fastening boots and shoes, which has largely contributed to cheapening these articles, was invented about

1818 by Joseph Walker of Hopkinton, Mass.—In a modern shoe factory the division of labor on the various parts of a shoe is carried to its greatest extent. The uppers and linings are cut and stitched generally in one department, where the buttonholes are worked by hand or by a machine especially adapted to that purpose, and the buttons put on or eyelets punched, if for a laced shoe. The uppers being ready, the first process in bottoming is to wet the soles, which, after being partially dried, are passed under a heavy roller, which takes the place of the shoemaker's lapstone. They are then, if for machine sewing, after being properly cut out for the requisite sizes, run through a channelling machine, which takes out a thread of leather from the outside edge in the bottom of the sole, leaving a thin narrow flap all round, so that when the stitch is laid in the place of the leather thus removed the bottom may be hammered down so smoothly as hardly to indicate where its surface was raised to allow of the stitching. The upper is then drawn over the last and tacked on the insole, and the outsole is tacked on. The last is now withdrawn, and the shoe passed to the sewing machine, where the stitch is made through the outsole and insole, and the edge of the upper coming between them, the flap raised for the channel being laid and cemented over the seam. The heel is now put on in the rough, and the edges of both heel and sole are trimmed and burnished. In making a "turn" shoe, the sole is shaped before tacking to the last, on which it is placed with the grain side of the leather, or that which is to form the bottom of the shoe, next the last; the upper, with the stiffening in, is then pulled over, wrong side out, then lasted and sewed, the last being taken out after sewing, and the surplus upper cut away. The shoe is then turned right side out, first at the seat, then the ball and toe, the last again put in, and the sole and stiffening hammered into proper form. A "team" of shoemakers consists of from four to nine men, comprising lasters, heelers, trimmers, burnishers, and finishers, who complete the shoe, after the uppers are made and the soles cut out. But the number of men in a team and the way in which the work is divided up are altogether dependent upon the kind of work. What is called custom work, or making boots and shoes to measure for individuals, has of late years become comparatively obsolete. The styles of boots and shoes have not varied to any great extent for many years, the extremes of fashion having been from a long, narrow sole to a short and very broad one, with at times what is known as a "box" toe, and from a small, high heel, of from $1\frac{1}{2}$ to 2 in., to one of about an inch, more broad and comfortable.

SUPPLEMENT TO VOLUME XIV.

PROTAIS

PROTAIS, Paul Alexandre, a French painter, born in Paris in 1826. He accompanied the French forces to the Crimea and Italy, having devoted himself to military subjects from the beginning of his career. Of his numerous pictures the most important are "The Battle of Inkerman," "Taking of a Battery of the Mamelukes," "The Last Thought," "Brigade of General Cher on the Route to Magenta," "Passage of the Sesia," "A Sentinel," "The End of the Halt," "An Interment in the Crimea," "The Conqueror's Return to the Camp," "A Wounded Soldier," "The Night of Solferino," "The Army of Metz," "Prisoners, near Metz," "Swiss Guards," "The Morning before the Attack," and "The Evening after the Combat." The last two are considered his masterpieces.

PUVIS DE CHEVANNES, Pierre, a French painter, born in Lyons about 1840, died in 1871. He studied with Henri Scheffer and Couture, and devoted himself largely to mural painting. His works include "Ave Picardia Nutrix" (a monumental work containing eight figures, in the museum at Amiens), "Massilia, a Greek Colony," "Marseilles—the Gate of the Orient," "The Beheading of St. John the Baptist," "Mary Magdalene in the Desert," "Peace" and "War," and "The Year 732—Charles Martel saved Christianity by his Victory over the Saracens near Poitiers."

PUZZLES. From Samson's riddle, 1141 B. C., to the fifteen or gem puzzle of A. D. 1880, all nations and ages have put forth inventions to test the ingenuity and patience of the human mind. For a week the thirty young men puzzled over Samson's riddle, "Out of the eater came forth meat, and out of the strong came forth sweetness" (Judges xiv. 12), with the incentive of thirty changes of garment at stake on their success. The hand of King Oreon's sister and the crown of Thebes were the prize that Œdipus won in solving the famous riddle given by the Sphinx. Having perplexed the people of Boeotia with "What animal goes on

PUZZLES

four feet in the morning, two at noon, and three at night?" devouring all those who were unable to guess the answer, the Sphinx fulfilled her promise of self-destruction when Œdipus answered, "Man," and explained that her morning, noon, and night symbolized infancy, manhood, and old age. The first style of human speech abounded in enigmas; for what else are the emblems, symbols, and allegories with which the literature of the primitive peoples is filled? When Cyrus invaded Scythia, and received through a messenger from the people arrows, a rat, and a frog, to signify to him that unless he hid himself in the ground like a rat, or in the water like a frog, he could not escape the arrows of the Scythians, they proposed to him an enigma. In antiquity great truths and discoveries were not given to the people in simple language, but, couched in riddles, were communicated to a few disciples, who unravelled them at their leisure. Timæus of Locri, in explanation of God's infinity, proposed to his followers, "What is a circle whose centre is everywhere and circumference nowhere?" The ancient kings of Babylon and Egypt sent to each other enigmas to solve, and he who returned a wrong answer, or none, paid tribute to the other. One of these is given, though on doubtful authority, as follows: "There is a large temple, supported by a column, and the column surrounded by twelve cities; each one of these cities has thirty flying buttresses, and near these latter two women, one white and the other black, who measure the extent of them." The temple was the world; the column was a year; the twelve cities were the months, and the flying buttresses, the thirty days; and the two women represented light and darkness, or day and night. Alexander used his sword to save his brains, in cutting the knot with which Gordius, king of Phrygia, had bound the pole of his chariot to the yoke. An oracle had declared that whosoever should untie the knot should reign over

Asia. When he had severed it with his sword, Alexander proceeded to carry out the oracle.

—*Magic Squares.* The ancients ascribed great virtues to magic squares—a name given to a square divided into several small equal cells, filled up with the terms of any progression of numbers, but generally an arithmetical one, in such a manner that those in each band, whether horizontal, vertical, or diagonal, shall always form the same sum. This disposition of numbers formed the basis and principle of many of their talismans. A square of one cell, filled up with unity, was the symbol of the deity, on account of the unity and immutability of God; for they remarked that this square was by its nature unique and immutable. The square of two was the symbol of imperfect matter, on account of the impossibility of arranging this square magically. Magic squares of any size, odd or even, may be formed by classifying all numbers under three different heads, and applying to each separate head a rule peculiar to itself. All numbers come under one of the following classes: 1, all odd numbers; 2, all even numbers that, being divided by 2, give an odd number for a quotient; 3, all even numbers that, being divided by 2, give an even number for a quotient. Before giving the rules for forming squares that come under the above heads, we will give a rule to find the sum of each column in any square, perpendicularly, horizontally, or diagonally: Divide the number of places in one of the parallels plus the cube of the number of places by 2. Thus: 3 by 3 square,

$$\frac{3+3^3}{2} = 15; \text{ 4 by 4 square, } \frac{4+4^3}{2} = 34;$$

$$\text{5 by 5 square, } \frac{5+5^3}{2} = 65. \text{ Examples:}$$

1.					2.							
1	19	7	25	13	24	7	32	8	40	16	48	
10	23	11	4	17	18	43	26	2	34	10	42	
14	2	20	8	21	12	37	20	45	28	4	29	
18	6	24	12	5	6	31	14	39	15	47	23	
22	15	3	16	9	49	25	1	33	9	41	17	
					36	19	44	27	3	35	11	
					30	13	38	21	46	22	5	

$$\text{Sum, } \frac{5+5^3}{2} = 65.$$

$$\text{Sum, } \frac{7+7^3}{2} = 175.$$

I. *Odd-numbered Squares.* Place 1 in any of the small squares; then 2 in the perpendicular adjoining on the right, in any of the small squares, with the exception of the three that are contiguous, horizontally and diagonally to the place in which 1 is contained (the upper and lower parallels, taken together, are always to be treated as if they were contiguous to each other—that is, no two consecutive numbers can be placed in adjoining perpendiculars and in the

upper and lower parallels at the same time); then 3 in the next perpendicular to the right, as before, and at the same horizontal distance from the 2, and in the same direction, that the 2 is from the 1—taking care, however, if counting down, when the lower parallel is reached, to treat it as if it were immediately above the upper, and, *vice versa*, to treat the upper as if it were beneath the lower one, and also, when the extreme right perpendicular is reached, to treat it as if it were placed on the extreme left; and so on until we have set down a number that is an exact multiple of the number of places in one of the parallels; then place the number following in the same horizontal, but the second perpendicular to the right; then place the numbers following the same as with 2 and 3, until a multiple is reached; and so on until the square is completed. The following are some of the properties of the squares formed from this rule: 1. From any of the four sides, beginning with any number, take the numbers diagonally either way from it, and if, before we get the proper number of figures, the diagonal ends in one of the sides, continue on to the first place in an imaginary square adjoining, and take the figure from a similar place in the principal square, and continue diagonally in the same direction as before until we reach the opposite side from which we began, and we find the sum of these numbers equals the sum of each of the columns. For example (from the 5 + 5 and the 7 + 7 squares): $19 + 11 + 8 + 5 + 22 = 19 + 10 + 21 + 12 + 3 = 13 + 10 + 2 + 24 + 16 = 65$; and $49 + 31 + 20 + 2 + 40 + 22 + 11 = 49 + 19 + 38 + 8 + 34 + 4 + 23 = 175$. 2. Suppose we take one or more rows from the top, and place them beneath the lower one in the same order that we find them, or, *vice versa*, from lower to upper, the squares thus resulting will still be magic. 3. If we take one or more of the perpendiculars from the right or left side, and transfer them to the opposite side, we have another square that is magic. 4. For the first row of a new square write the numbers as directed in property 1, above; then, for the first figure in the second row, set down the number in the old square, in the first diagonal, in the opposite direction from the point at which we started to form the first row; then complete it in the same manner; and so on with the remaining rows until the square is completed, and still another magic square is the result. The following, in illustration of the above, are derived from the 5 × 5 square:

3.					4.				
14	2	20	8	21	25	13	1	19	7
18	6	24	12	6	4	17	10	23	11
22	15	3	16	9	8	21	14	2	20
1	19	7	25	13	12	5	8	6	24
10	23	11	4	17	16	9	22	15	3

5.

25	17	14	6	3
11	8	5	22	19
2	24	16	13	10
18	15	7	4	21
9	1	23	20	12

Other squares may be derived from these last, in the same manner that they were derived from the first, and these again can be resolved into other squares that are still magic; and so on, without end. This rule holds good for all odd-numbered squares except the 3×3 square. This (and indeed all odd-numbered ones) can be formed by placing unity in the middle cell of the horizontal band at the bottom, then proceeding from left to right, and descending diagonally (overlapping the perpendiculars and horizontals, as shown above). When 3 or a multiple of 3 has been set down, place the following number immediately above it, and continue as before. According to this disposition, the middle number occupies the centre. Examples:

6.

4	9	2
3	5	7
8	1	6

7.

11	18	25	2	9
10	12	19	21	3
4	6	13	20	22
23	5	7	14	16
17	24	1	8	15

II. *Even-numbered Squares*, which, the number of places in any of the parallels being divided by 2, give an odd number for a quotient; as:

8.

3	4	76	78	28	25	100	97	49	50
1	2	74	75	26	27	98	99	51	52
40	37	91	92	44	41	13	14	68	65
38	39	89	90	43	42	15	16	66	67
56	53	8	6	77	73	32	30	84	81
55	54	7	5	79	80	31	29	83	82
69	72	23	24	93	96	45	46	17	20
71	70	21	22	95	94	47	48	19	18
87	88	57	60	9	12	61	64	33	34
85	86	59	58	11	10	63	62	35	36

$$\text{Sum}, \frac{10+10^3}{2} = 505.$$

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For the formation of squares coming under this rule, we adopt the same principle that is used in the construction of odd-numbered squares, taking for convenience the rule already given in this article as an example, although any rule under which it is possible to form odd-numbered squares may be used equally well. The $10 + 10$ square is used for the illustration of the process. The first step is to divide the proposed square into sets of four places each by the heavy lines; now, counting the spaces between the heavy lines only, we have a $5 + 5$ square, each place of which is divided into four parts by the fainter lines. Divide the numbers that are to enter into the proposed square into sets of four each, each set containing four consecutive numbers; each set is then to be placed in a square bounded by the heavy lines, and each number in one of the four places into which these are again divided. The first set (1, 2, 3, 4) is to be placed where 1 would be placed according to the rule for odd-numbered squares, the second set (5, 6, 7, 8) where 2 would be placed, and so on. It will be noticed that the four numbers included between the heavy lines are not to be arranged in the same order throughout the whole square. The following is the rule for arranging them in proper order: Divide the square by a perpendicular line into two parts, so that there is one more parallel, counting only between the heavy lines, on the right side than on the left. Then—1, the proper order for all places in the diagonals to the right of this line is, $\frac{1}{3} \mid \frac{2}{4}$; 2, for all places in

the diagonals to the left of the line, $\frac{3}{1} \mid \frac{4}{2}$, 3, for one place on each side of the centre in the middle horizontal, $\frac{4}{3} \mid \frac{2}{1}$; 4, for one place immediately above the centre in the middle perpendicular, $\frac{4}{3} \mid \frac{1}{2}$; 5, for one place immediately below the centre in the middle perpendicular, $\frac{1}{3} \mid \frac{4}{2}$. The above five rules include all the places in a $6 + 6$ square, treated as required by the rule. For all larger squares the following are to be used in addition to the above: 6, for all places in the centre horizontal not mentioned in rules 1 and 3, the same as No. 4; 7, for all places above the centre horizontal not mentioned in the previous rules,

$\frac{4}{2} \mid \frac{1}{3}$; 8, for all places below the centre horizontal not mentioned in the previous rules, the same as No. 5. The square is now completed.

III. *Even-numbered Squares*, which, the number of places in any of the parallels being divided by 2, give an even number for a quotient; as:

9.

9	16	5	4
6	8	10	15
12	13	3	1
7	2	11	14

$$\text{Sum}, \frac{4+4^3}{2} = 34.$$

10.

33	48	49	64	25	24	9	8
26	23	10	7	84	47	50	63
35	46	51	62	27	22	11	6
28	21	12	5	86	45	52	61
40	41	56	57	32	17	16	1
31	18	15	2	39	42	55	53
38	43	54	59	80	19	14	3
29	20	13	4	87	44	53	60

$$\text{Sum}, \frac{8+8^3}{2} = 260.$$

To make the rule more clear, the squares are divided into quarters by the heavy lines. Begin by placing 1 in the upper right-hand corner of the lower right quarter; then go to the horizontal immediately beneath, and place 2 in a similar square in the lower left quarter; and so on downward, from right to left, and *vice versa*, until the lower horizontal is reached; then place the following number in a similar place in the quarter above on the same side; then proceed upward, from left to right, and *vice versa* (in the same manner that we proceeded downward when in the lower half), until the upper horizontal is reached; then the number following all multiples of the number of places in each parallel, if in the right half, to the place adjoining on the left of the multiple—if in the left half, to the right of it. From the upper row proceed downward, as in the lower half,

till you reach the lower horizontal of the upper half; then place the following number in a similar place in the quarter below on the same side; then proceed upward, in the same manner as in the upper half, till the upper horizontal of the lower half is reached; and so on, till you have written half of the figures in the proposed square. The first number of the second half write in the upper left-hand corner, and continue to complete the square in the same manner as before described. Properties 1, 2, and 3, of the odd-numbered squares in this article, are also true of these arrangements.—See “Recreations in Science and Natural Philosophy,” Dr. Hutton’s translation of Montucla’s edition of Ozanam, revised and corrected by Edward Riddle (London, 1851).—*The Anagram*, once popular as an indication of fate or character, serves now only as an amusement, or to devise a motto for a crest. (See ANAGRAM.)—*Conundrums* intend to denote in an obscure form something well known and familiar, and depend for their wit and the concealment of the answer on a play upon words; as, “What is the difference between a honeycomb and a honeymoon?” “One is composed of many little cells, and the other is one big sell.” The art of composing them was much cultivated during the middle ages. Numerous collections of them have been made in all languages. In French, Cotin gathered from everywhere the finest enigmas, under the title of *Recueil des énigmes de ce temps* (1st ed., Paris, 1656; 2d, Rouen, 1673). Menestrier about the same time composed a *Traité de l’énigme*.—*The Ring Puzzle* is of great antiquity; a treatise was written on it by the mathematician Cardan at the beginning of the 16th century. It is composed

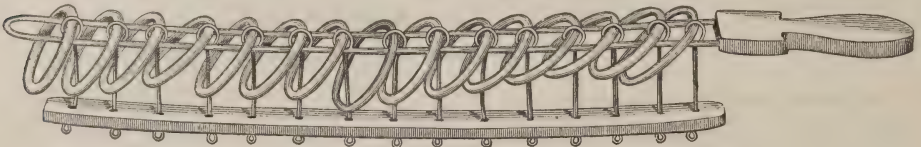


FIG. 1.—The Ring Puzzle.

of several rings, fig. 1, strung on a double rod, and fastened to a flat piece of bone or metal by means of wires which pass through the next ring beyond the one they fasten; the problem is to extricate the rod from the rings. To do this, begin by dropping the 1st, then the 3d; in order to take off the 2d, replace the 1st and drop the first two together; then drop the 5th, replace the first two, drop the 1st alone, replace the 3d and then the 1st; drop the first two and the 4th, replace the first two, drop the 1st and 3d, replace the 1st, and drop the first two together. You have then disposed of five rings, and the 7th stands second on the rod, the only position in which a ring can be dropped. Having dropped the 7th, the next step is to get rid of the 6th. In order to do this, the first five must be reconstructed, and then the

first four dropped, so that the 6th may stand second; it is then easily released, but the 5th remains in its stead; this can only be dropped by replacing the 4th, which by this time is done mechanically. Having successively dropped the 5th and the preceding four, the 9th is in position to drop. When you have mastered the principle, the only hindrance to taking off ten or fifteen of these puzzling rings seems to be the shortness of life and the difficulty of remembering whether your aim is to reconstruct or to release a given ring. To take off all the rings in a puzzle of ten, 681 moves are required.—*The Oblong Ring Puzzle* is made by forming a spiral spring with both ends of the wire with which it is formed turned backward and passed through the spiral. One end is left unconnected and free. The other is formed into a

circular part by carrying it to the other end of the spiral, and is there so connected as to form a loophole, through which the two rings tied

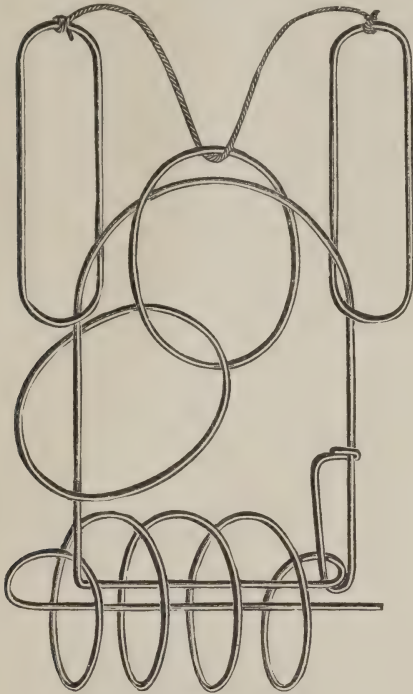


FIG. 2.—Oblong Ring Puzzle.

together can be passed; they can then be carried along on the wire and taken off; these two rings can also be passed over the spiral. The two rings linked together must not be crowded through the spiral. The unconnected end passes through every coil in the spiral, and must not be sprung out of its place. The different parts can be used in any way that does not strain any part of the puzzle. If a new string is required, use a fine one, and have it three inches long after being tied. The puzzle is, to pass the rings so that they will hang on the wire with one of the two rings tied together between the two rings linked together, without the string passing through either of the rings, as in fig. 2; but the string must not pass through the ring. To do this, pass the two rings tied together through the spiral, also through the loophole; carry them along on the wire until you reach the unconnected end; then take one of them off, and pass the other back to the circular part, and place it between the two rings linked together. To do this, it must pass through one of them; then draw the string and the other ring through, so that it will hang free between the rings linked together. Hold the puzzle with the spiral at the top and the loophole to the left. Pass the ring that is now free from the wire through the spiral from the right-hand end, following the wire that leads

to the loophole; pass it through the loophole, following the direction of the same wire; then place the two rings linked together, with the other ring between them, to the right-hand end of the spiral; then slip the ring that is between the two linked together through the spiral, so that one end will reach the loophole, and have the string on the end by the loophole; then bring the ring that is free from the wire toward you from the outside and let it drop through the circular part; then carry it around the loophole in the same way, winding the string tightly around the loophole until you have passed the ring through the circular part four times; then carry it to the right-hand end of the spiral, pass it through the spiral, and slip it over the unconnected end; then draw it back and pass it around on the coil forming the spiral, and as you pass it around the string will unwind from around the loophole; pass it through the loophole, also through the spiral, and the rings will be in the desired position.—*Love's Puzzle* consists of two hearts on a cord. A slip-knot of

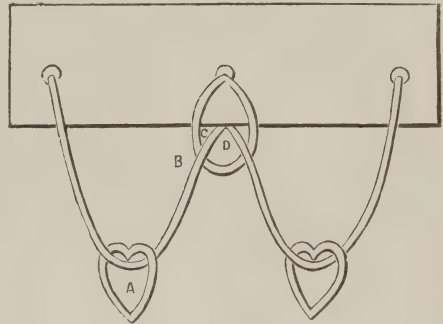


FIG. 3.—Love's Puzzle.

cord is first put through a puncture in the centre of a long narrow card. On each end a heart (or ring) is strung, and the cords are fastened to either end of the card. The problem is, to get the hearts together on the same loop. To do this, draw the heart A, fig. 3, along the string, through the loop B, until it reaches the back of the centre hole; by means of the cords C and D draw the loop B through the hole and heart, and pass the heart through the two loops that will be formed; then draw the loop back as before, and the heart may easily be passed to its companion.—*Scissors and Cord*. A simple device makes a puzzle with scissors and cord. A slip-knot is put into one handle, and the ends are passed through the other; these are then securely held, while the scissors are

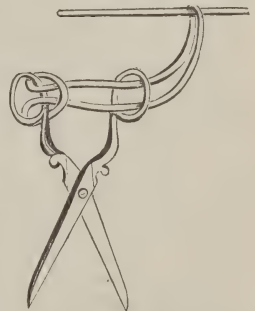


FIG. 4.—Scissors and Cord.

extricated. This is done by passing the noose through the other handle and then completely over the scissors.—*Heart and Ball*. To make the heart-and-ball puzzle, it is only necessary

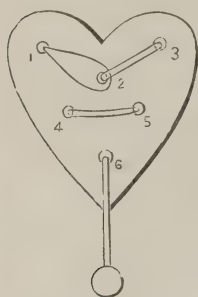


FIG. 5.—Heart and Ball.

to cut a thin piece of wood into the shape of a heart, make six holes in it, and provide a silk cord, which is to be doubled, and the two ends fastened into a small wooden ball. To play the ball on, pass the loop through the hole 6, fig. 5, from face to back, up through 2, and then through 3, 5, 4, and 1 in succession; then through 2 again, and down the back to 6; bring it through 6 to the face, and pass it over the ball; then draw the loop back again through 6 and 2, and the puzzle is set. To extricate the string from the heart, which constitutes the puzzle, place the heart before you in the position described in fig. 5, and slacken the string by drawing the ball toward the hole 6; loosen the rest of the string, and draw up the loop as far as possible; pass it through the hole 2 down the other side of the heart to 6, through which bring it to the face and pass it over the ball; then draw the loop back again through the same hole, and the ball and string will come off. The length of the string should be in proportion to the size of the heart; if the latter be $2\frac{1}{2}$ inches high, the string when doubled should be about 9 inches long.—*The Card Puzzle* is represented in fig. 6. A is a piece of card with a narrow slip B B divided from its bottom edge, only leaving sufficient at each side to hold it on. A slip of card C C is passed through a piece of clay-pipe stem D and through the slip B B, the two ends E E projecting to keep the stem in place. The puzzle consists in getting the

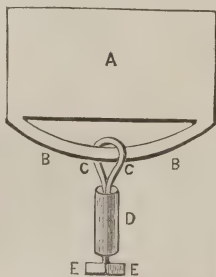


FIG. 6.—Card Puzzle.

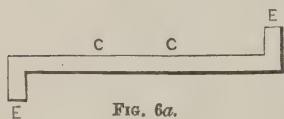


FIG. 6a.

pipe stem off without breaking it, or injuring any part of the puzzle. To do this, you have only to know how the stem was placed in position. The slip C C, E E is cut out of a piece of card in the

shape shown in fig. 6a. The card in fig. 6 must be gently bent at A, to allow the slip in the bottom B B to pass through the pipe stem as in fig. 6b; the detached slip with the square ends is then passed half way through the loop F at the bottom of the stem; it is then pulled through the stem double, by means of the loop of the slip to the card. Upon unbending the card, the puzzle will be complete and appear as in fig. 6.—*A Japanese Puzzle* consists of seven pieces carved in sandalwood, capable of being arranged in hundreds of devices. It is sold with a book giving 336 different designs and a key.—*Solitaire*. This game is played either with 32 pegs on a board with 33 holes, or with marbles in places hollowed out for them. These are arranged as in fig. 7. The 10th hole has no

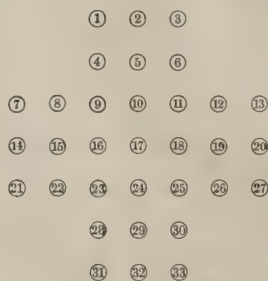


FIG. 7.—Solitaire.

peg, and the game consists in jumping one at a time, at right angles, until only one peg remains on the board, and that in the 10th hole. The first six moves clear off the upper square, and are as follows: 12 to 10, 3 to 11, 10 to 12, 4 to 6, 1 to 3, and 3 to 11. After this you continue in couplets, making ten moves with each hand, going alternately up, across, and down, till you have disposed of all the pegs but six. The ten double moves are: 16 to 4, 18 to 6, up; 13 to 11, 7 to 9, across; 6 to 18, 4 to 16, down; 25 to 11, 23 to 9; 14 to 16, 20 to 18; 11 to 25, 9 to 23; 30 to 18, 28 to 16; 21 to 23, 27 to 25; 16 to 28, 18 to 30; 31 to 23, 33 to 25. The remaining six are arranged in the shape of a cross at the bottom of the board, and are treated as follows: 24 to 22, 32 to 24, 25 to 23, 22 to 24, 24 to 10, the place of beginning.—*Patience*. There are several games of "patience" played with cards; a full account of them can be found in Lady Adelaide Cadogan's "Illustrated Game of Patience."—*Buried Cities* conceal the names of cities in a number of words, the letters coming continuously in their proper order, as: "A cackling hen tells all she knows. Ghent."—*The Rebus* is a picture or series of pictures which represent some proverb, a line of poetry, or a sentence of any kind.—*Enigmas*. The term "enigma" is now generally applied specially to a puzzle which is formed by numbering the letters in one or more words,

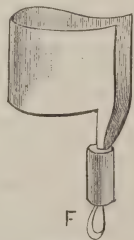


FIG. 6b.

so that the letters of other words made from them can be designated. A sufficient number of these latter must be given to bring in every letter of the original word or words at least once, and it must be guessed from them. —The “Fifteen” or “Gem Puzzle,” introduced to the American public in the autumn of 1879, is composed of fifteen small square blocks, numbered from 1 to 15, and contained in a square box large enough to hold sixteen such blocks. The blocks are to be mingled at random, replaced in the box, and pushed about until they are in regular order, as shown on the cover of the box, fig. 8. Out of the 1,307,674,368,000 varieties of chance arrangements which may be given to the numbers in placing

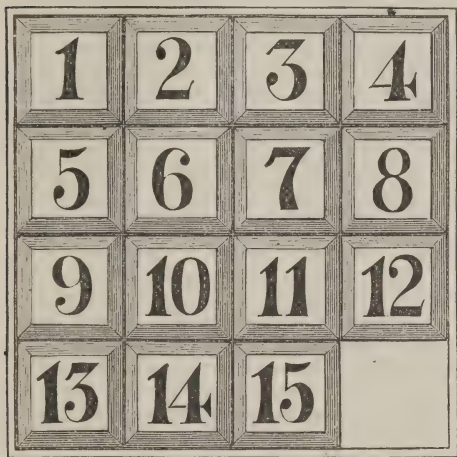


FIG. 8.—Fifteen Puzzle.

them in the box, there are just half in which it is possible, by subsequent movement, to dispose them in regular sequence, in any one of the four ways following: 1, by beginning, as is usual, with the series 1, 2, 3, 4 at the top, and reading from left to right; 2, by beginning with the same series at the bottom, and reading from right to left; 3, by placing this same series on the right-hand side, and reading from the bottom upward; 4, by placing it on the left-hand side, and reading from the top downward. In the remaining cases—half of the whole number possible, or 653,837,184,000—a similar result will be secured by proceeding on any one of these four plans, with the exception that a single couplet in the general series will remain somewhere obstinately inverted. In the usual mode of operating, this inversion commonly appears in the final row, as the fatal 14, 13, 15, or 13, 15, 14; it may also appear as a complete inversion of the triad, 15, 14, 13, which is really a concealed form of the inversion of a couplet; since any one number may be carried past any two preceding or following it without deranging the order of the rest, though no single number can be carried beyond a single neighboring number without produ-

cing an inversion somewhere else. Accordingly, whenever this state of things presents itself, what the operator has to do is, to invert the order of the entire series; that is to say, if he begins at the top, to read from right to left; if he begins at the bottom, to read from left to right; if he begins on the right-hand side, to read from the top downward; if he begins on the left-hand side, to read from the bottom upward. The numbers will then fall easily into their places, and the sequence will be perfect. No particular rules of movement are needed.

QUARTLEY, Arthur, an American painter, born in Paris, France, in 1839. He is entirely self-taught, and has been especially successful as a marine painter. After residing for some time in Baltimore, he settled in New York in 1875. His pictures include “Calm Days, Isles of Shoals,” “Evening at Narragansett,” “Low Tide,” “Making the Landing, White Island, Isles of Shoals,” “Morning Effect, North River,” “An Afternoon in August, Coast of Maine,” and “Morning Effect in New York Harbor.”

RADIOPHONY. The investigations of Messrs. A. Graham Bell and Sumner Tainter, which resulted in the invention of the phonograph, revealed the fact that thin disks of many different substances could be made to emit sounds by exposure to the action of a rapidly interrupted beam of sunlight. Continuing their experiments, these gentlemen found that audible sounds could be produced under similar action from the same substances in masses; and further, that by exposing them in a glass test-tube in immediate communication with a hearing-tube, other substances that could not be obtained in the shape of thin diaphragms or in tubular form, could be made sonorous. In this manner sounds were obtained from various crystalline bodies, from tobacco-smoke and gases, and from cotton-wool, worsted, silk, and fibrous materials generally. Substances of the latter class were found to be the most effective; and the fact was established that the loudest sounds are produced from substances in a loose, spongy condition, and from those that have the darkest or most absorbent colors. Feeble sounds were also obtained from a few liquids. Further experiments were made to test the general proposition that sonorousness, under the effect of intermittent light, is a property common to all matter. Collateral independent investigations of these phenomena have been carried on by M. Mercadier in France, Prof. Tyndall and W. H. Preece in England, and Mr. W. E. Röntgen, the conclusions of which generally tend to confirm this view. Prof. Tyndall found from experiments made with the electric light and the lime light

upon different gases and vapors, that the intensity of the sounds produced was dependent upon the absorptive power of the various bodies. The loudest sounds were obtained from the most athermanous bodies, while diathermanous substances yielded only faint sounds.

Messrs. Bell and Tainter also found that the sonorous effects were due to those rays of the spectrum only which are absorbed by the body. This view was tested by M. Mercadier by passing an intermittent beam from an electric lamp through a prism, and by Messrs. Bell and Tainter with sunlight and a prism, but with somewhat different results from those obtained by M. Mercadier. The experiment of Messrs. Bell and Tainter is illustrated in the diagram, fig. 1. A beam of sunlight was reflected from a heliostat, A, through an achromatic lens, B, so as to form an image of the sun on the slit, C. The beam then passed through another achromatic lens, D, and through a bisulphide-of-carbon prism, E, and formed a spectrum of great intensity, which, when focussed upon a screen, was found to be pure enough to show the principal absorption

G, which was so arranged that the lamp-black surface exposed was limited by a slit, as shown. Under these circumstances, with lampblack, sounds were obtained in every part of the visible spectrum except the extreme half of the violet, and also in the ultra red. With some substances, among them lampblack, the loudest sounds were obtained in the ultra red. No clearly established results were obtained in the ultra violet. The localization of the loudest sounds varied with different substances, and the experimenters were led to the conclusion that the nature of the rays which produce sonorous effects in different bodies depends upon the nature of the substances exposed to the beam, or upon the rays that they have the quality of absorbing. The discovery of these phenomena led Messrs. Bell and Tainter to the construction of a new instrument for use in spectral analysis, which they call the spectrophone, with the aid of which, by noting the bands of sound and silence in the ultra red region, a map of the invisible portion of the spectrum for different substances can be constructed. The eye-piece of a spectroscope is removed, and sensitive substances are placed in the focal point of the instrument behind an opaque diaphragm containing a slit. These substances are put in communication with the ear by means of a hearing-tube. If, then, a rapidly interrupted beam of light is passed through some substance whose absorption spectrum is to be investigated, bands of sound and silence are observed on exploring the spectrum, the silent positions corresponding to the absorption bands. The range of audibility of a number of different substances is indicated in fig. 2 by the rectangular figures in black enclosing their names. Of course the ear cannot compete with the eye in the examination of the visible part of the spectrum; but in the invisible part, beyond the red, where the eye is useless, the ear is invaluable. Mr. Bell believes that the sounds are produced by the alternate expansion and contraction, under the intermittent rays, of the air contained in the bodies experimented upon, operating to produce a continuous series of atmospheric pulsations. Prof. Tyndall concludes that the tones given out by the gases he experimented upon were the result of their rapid successive dilatations under the influence of the heat. Mercadier has obtained tones from the red and heat rays, and from the heat rays alone; and Tyndall produced sounds by placing a piece of iron not quite red-hot behind the interrupting disk. The words "light" and "photophone," which were at first used in describing these experiments, only in the most general sense, because the ordinary beam of light contains the rays which were operative, convey an inaccurate impression by seeming to ascribe to light actions which may be due to any form of radiant force, whether thermal, luminous, or actinic. M. Mercadier has suggested, and the other experimenters have adopted, the more accurate term "radiophone," to signify gener-

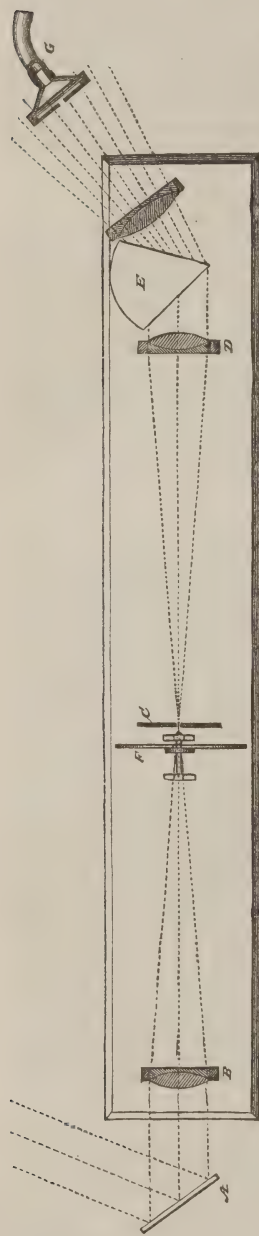


FIG. 1.

lines of the solar spectrum. The disk interrupter, F, was then turned with sufficient rapidity to produce from five to six hundred interruptions of the light per second, and the spectrum was explored with the receiver,

ical and explanatory, of the Old Testament, and the first volume, containing Genesis, was published in 1844.

RASSAM, Hormuzd, a British archæologist, born at Mosul, Mesopotamia, about 1828. He is descended from a Chaldean or Assyrian family which was included among the earliest Christian converts. When in 1847 Mr. Layard returned from his researches among the ruins of Nineveh, he brought with him Mr. Rassam, who had learned English from his brother's wife, a sister of the Rev. George Percy Badger, the Arabic scholar, and who had for two years been the explorer's companion. The young man entered Oxford, but in 1849 was appointed by the trustees of the British museum to return to Nineveh with Mr. Layard in order to make further investigations, which proved very successful. Coming back to England in 1851, Mr. Rassam was again sent out by the museum authorities, this time in place of Mr. Layard, and procured many valuable antiquities. Returning in 1854, he was made interpreter to the political resident's staff at Aden, and afterward assistant political resident. In 1864 he was despatched with a message from the queen to King Theodore of Abyssinia, in relation to the latter's imprisonment of the consul Cameron. He arrived at Massowah in July of the same year, but was not allowed to discharge his errand until January, 1866; and finally, when on the point of departure with the liberated captives, he was arrested, and with them kept in fetters from July, 1866, till March, 1868, just before Magdala was stormed by Lord Napier. In 1876 he was sent out by the British museum to effect certain Assyrian explorations, under a firman of the Turkish government. His discoveries were very important, and among the prizes which he brought back to England was a pair of bronze gates, 22 feet high, a memorial of the wars of Shalmaneser III., B. C. 850, which he found in the ruins of a suburban palace near Kalakli. He was also employed upon political missions in Armenia and Kurdistan, and in 1878 was sent, under another firman, upon a new exploring expedition to northern Syria, Assyria, and Babylonia, being especially fitted for such work by his vast acquaintance with oriental languages. He has published a "Narrative of the British Mission to Theodore, King of Abyssinia; with Notices of the Country traversed from Massowah, through the Soudân, the Amhâra, and back to Annesley Bay from Magdala" (2 vols., London, 1869).

RAYMOND, John T., an American actor, born in Buffalo, N. Y., April 5, 1836. He was placed in a counting house, but ran away from it at the age of 17, and appeared on the stage at the Rochester theatre, making his début as Lopez in "The Honeymoon." The attempt was a failure, but the managers, who thought they discovered comedy talent in him, kept him through the season. The next year (1854) he appeared at Niblo's Garden, New York, in

"Ingomar," and in 1855 entered upon a long engagement in Baltimore. After its close he played in most of the southern cities, appearing at Charleston as Asa Trenchard in "Our American Cousin," with Sothern as Dundreary. In 1861-'3 he played at Laura Keane's theatre in New York, his most noticeable part being that of Baby in "Peep o' Day." After travelling two or three years with a company of his own in Maryland and West Virginia, he went to London in the summer of 1867, and appeared at the Haymarket as Asa Trenchard, with Sothern, making a great success. After the withdrawal of the piece, he made a starring tour through the provinces, and returned to America, appearing at the Theatre Comique, New York, as Toby Twinkle in "All that Glitters is not Gold." He played for two seasons in San Francisco, returned to New York in 1871, and appeared at Booth's theatre and at the Globe, Boston, as Dick Swiveller and Wilkins Micawber. But his final and greatest success was when, in 1874, he brought out at the Park theatre, New York, "The Gilded Age," a dramatization of the novel of that name written by "Mark Twain" and Charles Dudley Warner. In this Mr. Raymond took the part of Col. Mulberry Sellers, which he made peculiarly his own, and which soon overshadowed everything else in the play. He went to England on a professional engagement in the summer of 1880; but his rôle of Col. Sellers did not prove popular there, and he soon returned.

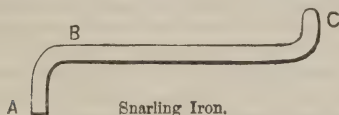
REGNAULT, Alexandre Georges Henri, a French painter, born in Paris in 1843, died in the defence of Paris, Jan. 19, 1871. His father was director of the manufactory at Sèvres. His first master was a pupil of Hippolyte Flandrin, whose cold tones and formal manner were directly antagonistic to the sensuous luxuriance that distinguishes the works of Regnault, and makes him the chief representative of the realistic and coloristic movement of recent French art, which confines the interest of a painting to simple form and color, degrades human figures to the office of conveying purely æsthetic impressions, and places them in the same category with animals or flowers, or the rich stuffs with which the artists of this school delight to fill their pictures. Regnault's true tendencies were developed in the atelier of Cabanel. At the age of 23 he won the grand prize of Rome with his "Thetis bringing the Arms of Achilles." In search of a new field for the picturesque, he visited Morocco. His picture of "Salome," exhibited in 1869, created a profound sensation in Paris. Among his most admired works are his portraits and sketches of portraits. A volume of his correspondence was published in 1873.

REINHART, Benjamin Franklin, an American painter, born near Waynesburg, Pa., in 1829. After very little instruction, he began life as a portrait painter, but afterward studied in New York, Düsseldorf, and Paris. On the breaking out of the civil war he went to Lon-

don, where he spent seven years in painting English genre subjects. In 1868 he settled in New York. His works include "Cleopatra," "Evangeline," "The Nymphs of the Wood," "Katrina Van Tassel," "Pocahontas," "Washington receiving News of Arnold's Treason," "Young Franklin and Sir William Keith," "The Pride of the Village," and numerous portraits of celebrated persons. Many of his pictures have been engraved.

REINHART, Charles S., an American artist, born in Pittsburgh, Pa., in 1844. After spending three years in the military service during the civil war, and four years in a steel manufactory at Pittsburgh, he studied art in Europe and settled in New York. His pictures in oil include "Caught Napping," "Clearing Up," "Reconnoitring," and "The Rebuke;" in water-color, "The Close of Day," "Gathering Wood," "At the Ferry," "No Trespassing," and "Noon and Midnight." The greater part of his art work has been devoted to the illustration of books.

REPOUSSÉ (Fr., beaten back), a process of working in metals, by driving out the design by means of beating on the reverse side. The art is of great antiquity, and was practised by the Egyptians, Cypriotes, and Etruscans. Some very beautiful examples of Etruscan repoussé work were on exhibition in the Castellani collection at Philadelphia in 1876. The art has flourished in Europe during the past three centuries. Benvenuto Cellini was a master in it, and was employed by popes, kings, and other princely patrons. It was said that he could work an ounce of silver into such exquisite form as to make golden ducats contemptible in comparison. The system is now used extensively in the United States, as well as in Europe, for decorating silver. The Bryant vase, made by Tiffany and co., and now in the metropolitan museum of art, New York, is an exquisite specimen of this process. When a bowl is to be wrought in the repoussé mode, it is first beaten into the required shape, and then given into the hands of the decorator. Upon its perfectly smooth surface is traced the design. Then the "snarling iron" comes into requisition. The end A of this is securely fastened in



a vise; the end C is placed on the inner side of the bowl in contact with that part of the decoration that is intended to be in relief; and the part B, near the vise, is skilfully struck with a mallet. The vibration of the iron drives out the silver without weakening it. The effect of the blow varies, according to the spot struck; the further from the vise, the more abrupt the shock. Snarling irons vary in length from 6 to 18 in., and in width from half an inch to an inch and a half. After the whole

design has been rounded out from within, the bowl is filled with a composition of plaster, pitch, and oil, and given into the hands of the engraver, who sits at a table with two or more sand bags (upon which he lays the bowl), a light mallet, and innumerable small tools, about 5 in. long, and fashioned at the end in every conceivable shape—sharp for engraving, blunt for planishing, and honeycombed for some of the backgrounds of the many exquisite designs. Points that are no larger than a pin's head have six perfect little cells in them, only discernible with a microscope. With 1,700 different tools, which at a glance might be mistaken for a box of nails, a workman complains that he has not half enough. And yet a finished piece of repoussé work, with its clear, sharp outline, suggests no thought of snarling iron, mallet, or engraver's tools.

REUTER, Baron Paul Julius, founder of the "Reuter Telegraphic Agency," born in Cassel, July 21, 1821. While employed in a bank at Göttingen, he spent his spare hours in reading the works of Gauss on electro-magnetism. In 1847 he became connected with a bookstore in Berlin, which was ruined by the revolution of the next year. He then went to Paris, and established a bureau for furnishing the newspapers with information by means of the lithographic process. In October, 1849, the Prussian government having opened to the public the first European telegraph line between Aix-la-Chapelle and Berlin, Reuter established in the former city a telegraphic news agency, which was enlarged as new lines of wire were opened, carrier pigeons being also employed. When, in 1851, the cable was laid between Calais and Dover, he established his headquarters in London, was naturalized as an Englishman, and proceeded to set up agencies in all parts of the world for the collection and transmission of commercial and political news. The system at once began to enjoy the favor of business men, but was adopted more reluctantly by the great newspapers. By furnishing all the journals that he served with the same news, Mr. Reuter was enabled to offer such low rates as to assist greatly in the development of cheap newspapers. During the American civil war and the Franco-German war he succeeded in providing the journals with accurate news of important events ahead of the official reports. In 1865 the business was transferred to a stock company, of which Mr. Reuter remained the manager. In that year he was awarded by the government of Hanover a concession for laying a cable between England and Germany, and in 1868 one by France for the first line between that country and the United States, which was opened in 1869. In 1871 he received the title of baron from the duke of Coburg-Gotha. The next year he obtained a concession of enormous powers from the shah of Persia, granting him the exclusive privilege of building railroads, working mines and forests, and farming the customs of the kingdom; but in his at-

tempt to take advantage of this great monopoly, he met with serious obstacles.

RHAMNUS PURSHIANA, a shrub or small tree, related to the buckthorn, 10 to 20 ft. high, the bark of which has been introduced into medicine within a few years, under the name *cascara sagrada*. It grows on the Pacific coast. Its medicinal properties are quite similar to those of other species of *rhamnus*. In small doses it is laxative; in large doses, cathartic. The fluid extract is the preparation generally employed. It may be given in doses of from 15 to 60 drops, according to the effect desired.

RHODE ISLAND. The population of the state in 1880 was 276,531, of whom 133,030 were males, 143,501 females, 202,538 natives, 73,993 foreign, 269,939 whites, 6,582 colored. The chief agricultural productions were 17,783 bushels of barley, 372,967 of corn, 159,339 of oats, 12,997 of rye, 79,328 tons of hay, 606,793 bushels of potatoes; number of horses on farms, 9,661; 3,523 working oxen, 21,460 milch cows, 10,601 other cattle, 17,211 sheep, 14,121 swine; value of manufactures, \$104,163,621. The state debt on Dec. 31, 1881, amounted to \$2,521,500; at the same date in 1882 it was \$1,606,500. The receipts and expenditures during 1882 were as follows:

Receipts	\$888,419 34
Balance in the treasury Dec. 31, 1881	210,789 90
Total	\$1,099,209 24
Expenditures	774,289 80
Balance in the treasury, Jan. 1, 1883	\$324,919 44

The deposits in the savings banks, on the 28th of November, 1882, amounted to \$50,657,876 80, including \$187,067 49 of surplus profits on hand; which shows in the deposits an increase of \$1,548,948 37 over those of 1881. The whole number of depositors in November, 1882, was 112,472, showing an increase of 9,481 over the preceding year.—The following educational statistics are for 1881: number of children from 5 to 15 years enumerated, 53,077; number of children reported attending public schools, 33,930; Catholic schools, 4,723; select schools, 1,994; no school, 12,730; total receipts, \$582,965 19; current expenditures, \$499,102 71; permanent expenditures, \$50,833 97. The charitable, reformatory, and penal institutions supported by the state are grouped together at Cranston, on "the state farm." The number of these institutions and of their inmates, on Dec. 31, 1882, was as follows: Asylum for the insane, 305; workhouse and house of correction, 252; almshouse, 221; Sockanosset school for boys, 188; Oaklawn school for girls, 24; state prison, 94; and Providence county jail, 129; in all, 1,163. The governor states the increase in the number of insane persons at the asylum to have been alarming for several years, and that in 1882 this increase was two thirds larger than in 1881, the insane patients reported at the close of the said two years having been 303 and 281 respectively.—The railway lines transacted during 1882 a considerably larger amount of busi-

ness than during the previous year: the total number of passengers in 1882 having increased to 3,822,220, and that of tons of merchandise to 672,391. But their general expenses have so far increased that in their net earnings there has been a decrease of \$244,869 75.—The population of the principal places, by the census of 1880, was: Providence, 104,857; Pawtucket, 19,030; Woonsocket, 16,050; Newport, 15,693; Lincoln, 13,765; Warwick, 12,164. See map in supplement to Volume V.

RICHARDS, Brinley, a British musician, born in Carmarthen, Wales, in 1819. His father was an organist. He was educated at the royal academy of music, where he gained a scholarship. He ranks high as a pianist, but is especially known as a composer of Welsh national songs. Among these are "Cambrian War Song," "The Cambrian Plume," and "The Harp of Wales." His sacred songs include "In the hour of my distress," "The pilgrim's path," "As o'er the past," and "Through the day;" and his part songs, "Up, quit thy bower!" "What bells are those?" "Sweet day, so cool," and "Ye little birds." He has also published piano and orchestral music.

RICHARDS, Thomas Addison, an American painter, born in London in 1820. His parents emigrated to Georgia when he was a boy, and he settled in New York in 1845. From 1858 to 1860 he was director of the Cooper union school of design for women, and since 1867 he has been professor of art in the university of New York. He was elected an associate of the national academy of design in 1849, and an academician in 1851, and has been corresponding secretary since 1852. Among his best works are "Alastor, or the Spirit of Solitude," "The Indian Paradise," "Edisto River," "French Broad River," "Live Oaks of the South," "The Rhine," "Warwick Castle," "Chatsworth, England," "Lake Thun, Switzerland," "Lake Winnipiseogee," and "Sunnyside." He has contributed many pictorial papers to the magazines, and has illustrated numerous books. One hundred of his pictures were exhibited and sold in New York in 1871. He was the author at an early age of a text-book on painting entitled "The American Artist." In 1842 he made the drawings for "Georgia Illustrated," and subsequently published "The Romance of American Landscape" and "Pictures and Painters;" and for several years he was the American correspondent of the London "Art Journal."

RICHARDS, William T., an American painter, born in Philadelphia in 1833. He studied in Rome, Florence, and Paris, and in 1856 opened a studio in his native city. His works in oil include "The New England Coast," "Atlantic City," "Mid-Ocean," "June Woods," "Midsummer," "Ebb Tide," "Old Orchards at Newport," "The Wissahickon," and "Out in the Country;" in water-color, "Mount Desert," "Off the Spar Buoy, Atlantic City," "Lake Squam," "The Third Beach, Newport," "So-

west Point, Canonicut," and "Gooseberry Island, near Newport."

RIPLEY, George, an American scholar, born in Greenfield, Mass., Oct. 3, 1802, died in New York city, July 4, 1880. He was the youngest son of Jerome Ripley, a merchant, from whom he inherited a moderate fortune. He was fitted for college by his kinswoman, Margaret Ripley of Concord, graduated at Harvard in 1823, and three years later at the Cambridge divinity school. In 1825-'6 he was a mathematical tutor in the university. From 1828 till 1841 he was pastor of the Purchase street (Unitarian) church in Boston. He was an intimate friend of Theodore Parker, and apart from his clerical duties devoted himself especially to the study of philosophy, and also became exceedingly familiar with German theology and biblical criticism. In the great philosophical controversy which prevailed in Boston in 1837 till about 1845, he took part against the school of Locke and Paley. With a view to promote the transcendental or spiritual conception of the soul and its relations he commenced the publication of "Specimens of Foreign Literature" (14 vols., Boston, 1838-'42), and himself translated the first two volumes of the series, selecting his material from the writings of Cousin, Jouffroy, and Constant. This work, which he called "Philosophical Miscellanies," was enriched by an elaborate introduction from his pen, and was republished in Edinburgh in 1857. In 1839 Mr. Ripley became still more conspicuous through a controversy with Prof. Andrews Norton of the Harvard divinity school, in which, in two public letters, he explained the philosophy and theology of Spinoza, Schleiermacher, and De Wette, and defended them against the imputations of that theologian ("Letters to Andrews Norton on the Latest Form of Infidelity," Boston, 1840). He was associated with Ralph Waldo Emerson and Margaret Fuller in the editorship of "The Dial" in 1840-'41, and also contributed largely to the "Christian Examiner" and other periodicals. He founded the "Brook Farm Association of Education and Agriculture," in West Roxbury, Mass., in 1841, and was its president till the dissolution of the association in 1847. Hawthorne, who for a short time was connected with it, used it as the occasion of his "Blithedale Romance;" but no authentic history of the experiment has ever been published. According to its constitution, it was intended "more effectually to promote the great purposes of human culture, to establish the external relations of life on a basis of wisdom and purity, and to substitute a system of brotherly coöperation for one of selfish competition." The association had about 70 members, who cultivated a farm, taught pupils, and published "The Harbinger" (1845-'9), edited by Mr. Ripley with John S. Dwight and Charles A. Dana, which advocated the doctrines of Fourier. In 1849 he became the literary critic of the New York "Tribune," which post he held till his death. He was also for several years a regular

writer for the critical department of "Harper's Magazine." With Bayard Taylor, he edited "A Handbook of Literature and the Fine Arts" (New York, 1852). In 1856 Mr. Charles A. Dana, having undertaken the editorship of the "New American Cyclopædia," invited Mr. Ripley to join him in the enterprise. The first volume of the work was published in 1858, and the last in 1863. In 1869 Mr. Ripley visited Europe, where he travelled extensively and wrote a series of letters for publication. After his return the revised edition of the Cyclopædia was commenced under a modified title, the first volume of which appeared in 1873, and the last in 1876. In 1874 he received the degree of LL. D. from St. Lawrence university. He was twice married: first to Sophia W. Dana, who died in 1861; and in 1865 to Mrs. Louisa A. Schlossberger, who survived him.

RIVIERE, Briton, an English painter, born in London, Aug. 14, 1840. He studied with his father, who was a teacher of drawing, and afterward graduated in the classical course at Oxford. He is especially distinguished as an animal painter. Among his pictures are "Rest from Labor," "Sheep on the Cotswolds," "On the Road to Gloucester Fair," "Iron Boys," "Romeo and Juliet," "The Poacher's Nurse," "Strayed from the Flock," "The Long Sleep," "Fox and Geese," "Circe transforming the Friends of Ulysses into Pigs," "War Time," "The Last of the Garrison," "All that was left of the Homeward-bound," "A Stern Chase is always a Long Chase," and "A Legend of St. Patrick."

ROE, Edward Payson, an American author, born in New Windsor, N. Y., in 1838. His early home is described in his "Opening of a Chestnut Burr." He studied at Williams college and at Auburn theological seminary, and in 1862 became chaplain of the 2d New York cavalry. He rode as a volunteer in Dahlgren's raid within the defences of Richmond, in the spring of 1864. Subsequently he was a chaplain in the hospitals at Fortress Monroe. After the war he became pastor of the Presbyterian church at Highland Falls, N. Y., near West Point, and delivered lectures on topics connected with the civil war. After walking through the smoking ruins of Chicago, he began his novel "Barriers Burned Away," which was published as a serial in the New York "Evangelist," and appeared in book form in 1872. Of a cheap edition (1882) 87,500 copies were sold. The great success of this book, together with impaired health from pastoral work, induced Mr. Roe to give up preaching and settle at Cornwall-on-the-Hudson in 1874, where he has since given his time to literature and the cultivation of small fruits. His subsequent novels, all of which have had a wide circulation, are: "What Can She Do?" (1873); "The Opening of a Chestnut Burr" (1874); "Near to Nature's Heart" (1875); "From Jest to Earnest" (1876); "A Knight

of the Nineteenth Century" (1877); "A Face Illumined" (1878); "A Day of Fate" (1880); and "Without a Home" (1881). He has also published "Play and Profit in my Garden" (1873), "The Culture of Small Fruits" (1876), and "Success with Small Fruits" (1880). His novels have been republished in England, and are in course of translation into German.

ROON, Albrecht Theodor Emil, count von, a German soldier and statesman, born at Pleushagen, near Colberg, April 30, 1803, died Feb. 23, 1879. He was educated at the Berlin barracks, became a second lieutenant in 1819, and studied at the military academy from 1825 to 1827. In 1828 he was appointed a teacher of cadets. In 1833 and 1834 he was engaged in topographical work, and in 1835 was attached to the general staff. From 1838 to 1841 he was an instructor in the military academy. In 1843 he joined the general staff, and was made military instructor to Prince Frederick Charles, and afterward his military governor, accompanying him in his journeys through Switzerland, Italy, France, and Belgium. After the education of the prince was completed, Major von Roon became in 1848 chief of staff to the 8th army corps in Rhenish Prussia; and in 1849 he took part in the Baden campaign as chief of staff to Gen. Hirschfeld. He became in 1856 a major general, commanding the 14th division at Düsseldorf. Having won the favor of the prince regent (the present emperor) by his efforts to effect certain reforms in the Prussian military organization, he was in 1859 made a lieutenant general, and the same year was appointed minister of war. The portfolio of marine affairs was added to his charge in 1861. In spite of the opposition of the diet, he succeeded in reorganizing the army, and the fruits of his ability and energy were reaped in the Prussian successes in the Schleswig-Holstein campaign of 1864 and the Austrian war of 1866, in the latter of which Von Roon participated in the field. The result of the Franco-Prussian war shed more glories upon his wonderful powers as an organizer, and in 1871 he was made a count. In that year he resigned the ministry of marine, and in 1872, his conservative policy being in conflict with that of Bismarck, he gave up the war portfolio, but was at once made president of the council, and at the beginning of 1873 a field marshal. In the following November, in order that Prince Bismarck might unite in his own person the offices of chancellor and president of the council, Von Roon left the cabinet and retired to his estates. He wrote *Grundzüge der Erd-, Völker- und Staatenkunde* (1832; 3d ed., in 3 vols., 1847-'55), *Militärische Länderbeschreibung von Europa* (1837), and other valuable works.

ROSS-CHURCH, Florence Marryat, an English authoress, born in Brighton, July 9, 1837. She is a daughter of Capt. Frederick Marryat, the novelist. She was educated mainly at home, and in 1872 became editor of "London Society." Her novels, some of which have been

translated into several of the continental languages, include "Love's Conflict" and "Too Good for Him" (1865); "Woman against Woman" and "For Ever and Ever" (1866); "Confessions of Gerald Estcourt" and "Nelly Brooke" (1867); "Girls of Feversham" and "Veronica" (1868); "Petronel" (1869); "Her Lord and Master" (1870); "The Prey of the Gods" (1871); "Mad Dumaresq" and "No Valentines" (1873); "A Little Stepson" (1877); and "Her Word against a Lie" (1878). She has also published her father's "Life and Letters" (1872).

ROSSETTI, William Michael, an English author, son of Gabriele Rossetti, born in London, Sept. 25, 1829. He was educated at King's college school, London, was appointed in 1845 to a clerkship in the excise office, and in 1869 became assistant secretary there. He was active in the pre-Raphaelite movement begun in 1848, and wrote for "The Germ," the magazine that represented it. Subsequently he was fine-art critic for several periodicals in succession. He has published a very literal translation, in blank verse, of Dante's "Hell" (1865); "Fine Art, chiefly Contemporary" (1867); "Mrs Holmes Grey," a poem (1870); and "Lives of Famous Poets" (1878); and has edited a series of "Popular Poets" (1870-'75), and the poems of Shelley, William Blake, and Walt Whitman. He has also lectured on Shelley's life and works. In 1874 he married a daughter of Ford Madox Brown, the painter, who is herself an artist.

RUSSELL, Charles William, an Irish historian, born in the County Down, Ireland, in 1812, died March 26, 1880. He was educated at Maynooth college, and in 1857 was made president of that institution. He was appointed a member of the royal commission on historical manuscripts in 1869, and edited, with Mr. Pendergast, several volumes of the state papers relating to Ireland, beginning with the reign of James I. He published a translation from the German of the tales of Canon von Schmidt (3 vols., 1846), and Leibnitz's "System of Theology," with introduction and notes (1850). His chief work, "The Life of Cardinal Mezzofanti" (1858), was translated into Italian (Bologna, 1859). The second edition (1863) was augmented by ten fac-simile autographs of the cardinal, in different languages.

RUSSO-TURKISH WAR. In July, 1875, the people of the Christian province of Herzegovina, European Turkey, rose in rebellion against their Turkish masters. The direct cause of the movement is variously stated as having been the exactions of the tax-gatherers and the brutal treatment of two Christian women, following the visit of the emperor of Austria to Dalmatia, which naturally suggested to the Herzegovinians a comparison of their own condition with that of their brethren over the Austrian border. The revolt soon spread to Bosnia, and, aided by volunteers from Montenegro and Servia, the insurrectionists under

Liubibratitch and Peko Pavlovitch successfully withstood such forces as were sent against them. The Turkish government was profuse in its promises of reforms, but the insurrectionists put no confidence in them. In January, 1876, a circular drawn up by Count Andrassy, the Austrian chancellor, and endorsed by Russia, England, Germany, France, and Italy, was submitted to the Porte, demanding complete religious liberty, the abolition of the farming of the revenue, application of the direct taxes to local improvements, creation of a mixed commission to oversee the reforms, and amelioration of the condition of the agricultural population. On Feb. 11 the sultan issued a decree promising complete religious liberty, reform in the taxation, sale of waste lands to the needy, mixed commissions to oversee reforms, and an increase of the sums devoted to local improvements. The insurrectionists refused these terms, and demanded an independence like that of Montenegro. In April they submitted certain proposals as a basis for a suspension of hostilities, among which were the confinement of the Turkish troops to six fortresses, permission to retain their own arms until the Mohammedans had surrendered theirs, the suspension of taxes for three years, the leasing of one third of the lands occupied by the Christians to their cultivators, the immediate execution in those portions of Bosnia not in revolt of the reforms suggested by the Andrassy note, and the appointment by the great powers of a commission to oversee the reforms. Hostilities were suspended, but soon broke out again, and the Turks were enabled to provision their garrisons in Herzegovina only after severe fighting and heavy losses. On May 7, during a riot in Salonica, caused by the abduction of a Bulgarian girl by a Turkish official, the French and German consuls were massacred by a mob. Their families were paid a large indemnity by the Porte, but the punishment inflicted upon the ringleaders of the mob was pronounced insufficient by the governments outraged. The chancellors of Russia, Germany, and Austria met at Berlin, and formulated the Gortchakoff note or Berlin memorandum, declaring that Turkey had virtually pledged herself to carry out the reforms called for by the Andrassy note, that she had failed to do so, and that the Salonica outrage showed the powerlessness of the sultan to restrain his subjects. It demanded an armistice of two months on the basis of the Andrassy note, during which the Porte must reach an adjustment of its relations with the provinces in insurrection, or it would become necessary for the great powers to take effective measures to preserve the peace. France and Italy gave in their adhesion to this note, but England refused to concur, on the ground that it must inevitably lead to the military occupation of Turkey, and sent a fleet to Besika bay, at the southern end of the Dardanelles. In the night of May 30-31 the sultan Abdul-Aziz was deposed by a palace conspiracy,

and was succeeded by Prince Murad Effendi, eldest son of the late sultan Abdul-Medjid, as Murad V. An insurrection which had broken out among the Christian inhabitants of Bulgaria was stamped out during May, with circumstances of great atrocity, by the bashi-bazouks (Turkish irregulars) and Circassians, colonies of whom, emigrating from Russian rule in their homes, had been planted in Bulgaria. Gradually, partially through the efforts of Mr. McGahan, an American journalist, and Mr. Eugene Schuyler, American secretary of legation at Constantinople, the facts became known in Europe, and excited such popular indignation that the English government informed its minister at Constantinople that, in case Russia made war, Great Britain would find it practically impossible to interfere in defence of Turkey.—In the mean time the governments of Serbia and Montenegro had found themselves no longer able to restrain the zeal of their people to aid the insurgents, and on July 2 declared war against Turkey. Many Russian volunteers joined the Servians, and one of them, Gen. Tchernayeff, commanded the chief of the four armies that now invaded Turkish territory. The Servians, however, were at once driven back on the Timok and on the Ibar, and offensive operations on their part came to an end in a few days. Tchernayeff's army in the south, after falling back within the Servian boundaries, endured six days of hard fighting about the stronghold of Alexinatz, in the latter part of August, with such results as to induce the Servian government to ask for the mediation of the powers. The terms of peace offered by the Porte required the rendering of homage at Constantinople by the prince of Serbia, the reoccupation by the Turks of the Servian fortresses surrendered in 1867, the dismantling of other fortresses, the reduction of the Servian army, the increase of the Servian tribute, a Turkish railway across the country, and the *status quo* for Montenegro, where the success of the fighting had been all on the side of the valiant mountaineers. The powers paid no attention to these terms, but offered as counter-propositions self-government for Bosnia and Herzegovina, a Christian governor for Bulgaria, a port for Montenegro, and the *status quo* for Serbia, except that she should pay a war indemnity. Meanwhile the sultan Murad had been deposed on Aug. 31, on the ground of mental incapacity, and succeeded by his brother Abdul-Hamid II. Fighting was renewed in Serbia at the end of September, but Gen. Tchernayeff's lines were broken at Junis on Oct. 29, and two days later the Turks entered Alexinatz. Russia then presented to Turkey an ultimatum, demanding an immediate suspension of hostilities, and the Porte complied. The Montenegrins had almost entirely cleared their own territory of Turks, and occupied adjoining portions of Albania and Herzegovina. On Nov. 4 the English government suggested a conference at Constantinople, to be composed

of two representatives of each of the great powers, as well as of Turkey. The basis suggested for the conference included the independence and territorial integrity of Turkey; a declaration that none of the powers sought territorial advantages or exclusive influence; the *status quo*, speaking roughly, for Serbia and Montenegro; a system of administrative autonomy for Bosnia and Herzegovina; guarantees of a similar kind against maladministration in Bulgaria; and the execution of the Porte's promised reforms. There was to be no question of the erection of a tributary state. The powers finally agreed to the conference plan. The definite conference began its sessions on Dec. 23, and on the same day Midhat Pasha, the grand vizier, promulgated a Turkish constitution after the West-European model. The final proposals of the conference were confined to a small addition to the Montenegrin territory; peace with Serbia on the *status quo* basis; the nomination by the Porte, in concert with the powers, of governors general for Herzegovina, Bosnia, and Bulgaria; and the appointment by the powers of two commissioners to superintend the reforms. But, as it had been announced that England would in no contingency coerce Turkey, the minimized proposals of the conference were refused by the Turkish government on Jan. 18, 1877, and the conference broke up. The Porte made peace with Serbia, but Montenegro held out for terms that were unacceptable at Constantinople. Subsequently Russia proposed that the powers should unite to sign a public declaration setting forth their demands upon Turkey; and on March 31 a protocol was signed at London by representatives of Russia, Germany, Austria, France, Italy, and Great Britain, announcing the intention of the powers to watch carefully over the manner in which the promises of the Porte should be fulfilled, and reserving to them the right, in case their hopes were again disappointed, to consider in common as to the means best fitted to secure the well being of the Christian population and general peace. Separate declarations were made by the representatives of Great Britain, Russia, and Italy, which greatly modified the appearance of unanimity; and on April 16 Prince Gortchakoff informed Lord Derby that if the Porte's reply should prove unsatisfactory, the time for military action would have arrived. Three days later the Porte angrily rejected the protocol, on the same grounds as it had the proposals of the conference—that it was a disrespectful outside pressure for reforms which the Porte professed itself willing to initiate of its own motion, and involved a virtual abdication of sovereignty in its European provinces.—On April 24 the Russian emperor issued at Kisheneff, the headquarters of the army which had for six months been massed on the Roumanian frontier, a manifesto to his people declaring war, and 50,000 of his troops the same day crossed the Pruth into Roumania. At

the same time, in Asia, a Russian army of some 70,000 men, under the grand duke Michael and Gen. Loris-Melikoff, crossed the Turkish frontier in Transcaucasia, and advanced on Kars and Batum. The army which now proceeded to occupy the Roumanian bank of the Danube was commanded by the grand duke Nicholas, and was supposed to be 200,000 strong, but many of the battalions were incomplete in numbers. A convention was arranged with Roumania by which a free passage was granted the Russians, and two months were occupied in moving men and stores to the banks of the Danube. These operations might have been seriously obstructed by the Turks, had not their commanding general, Abdul-Kerim Pasha, been old and incapable, and no important action took place. On June 24 a Russian force crossed the Danube by bridges of boats at Braila and Galatz, and occupied Matchin. Three days afterward the main army crossed further up at Simnitsa, and occupied Sistova. A small body of cavalry pushed on and occupied Tirnova, the ancient capital of Bulgaria, and a civil government, composed chiefly of Bulgarians under a Russian commander, was established there. On July 16 Nicopolis was surrendered to Gen. Krüdener after a day's bombardment. Gen. Gurko with a flying column crossed the Balkans by a difficult pass pointed out to him by Bulgarians, and took the Shipka pass in reverse. Osman Pasha, who had started from Widin for the relief of Nicopolis, turned aside and occupied Plevna, beginning the construction of defences which in time became very formidable. About the same time Mehemet Ali (a German by birth) and Suleiman Pasha were recalled from Montenegro, which in the preceding months had almost been resubdued, and the former was appointed to succeed Abdul-Kerim, while Suleiman was given an independent command in Roumelia. On July 20 the Russians received their first check in Europe, Gen. Schilder-Schuldner's attack upon Plevna being repulsed with severe loss. Reinforcements were pushed forward, and even a Roumanian corps crossed the Danube; but Osman was strengthened also until he had a force of nearly 50,000 men, and when attacked on July 30 by Gen. Krüdener and Prince Shakhovski, he inflicted a severe defeat and a loss of upward of 7,000 men upon the Russians. At the same time Gen. Gurko, who had penetrated within 30 miles of Adrianople, was forced to fall back before Suleiman into the Shipka pass, where, after a desperate ten days' struggle, involving heavy losses on both sides, the Russians, under Gen. Radetzky, succeeded in maintaining themselves. On the Lom the cesarevitch was repulsed by Mehemet Ali, who obtained the entire left bank of that stream. The whole imperial guard was now sent forward from Russia, the mobilization of 188,000 men of the landwehr was ordered, and the entire Roumanian army crossed the Danube under Prince Charles. On Sept. 11 an-

other grand assault was made on Plevna in the presence of the emperor. On the left the younger Gen. Skobelev, at a terrible expense of life, captured three redoubts, which were retaken by the Turks the next day. On the right the hitherto despised Roumanians captured and held the Grivitza redoubt. But the general result of the attack was so disastrous to the Russians that they abandoned all hope of success by assault, and Gen. Todleben was summoned from Russia to undertake the reduction of Plevna by a regular siege. Lovatz, south of Plevna, had on Sept. 3 been captured by Gen. Skobelev; and while Suleiman was wasting his strength in new efforts to dislodge the Russians in the Shipka pass, and the Turks on the Lom were making weak demonstrations against the cesarevitch, Gen. Gurko with the imperial guards was capturing Dubnik, Telish, and Etropol, and cutting off Osman's south-western communications. In spite of 10,000 men sent out from Sophia by Shefket Pasha, the butcher of Bulgaria, who forced a passage through the Russian lines during the last of September, by the end of October the isolation of Plevna was complete. Driven by hunger, Osman made a sortie on Dec. 10, in the hope of breaking through the Russian lines and reaching Widin. Crossing the Vid, he was repulsed after a desperate fight, and attempted to reënter his works; but finding them occupied by the enemy, he surrendered his whole force of 30,000 men, including 10 pashas and 78 guns. Servia, which had been waiting to make sure that Russia was to be successful, now declared war against Turkey, and on Dec. 15 her troops crossed the frontier. They soon captured several towns, and the Timok corps effected a junction with the Russians. Prince Nicholas of Montenegro had improved the departure of the Turkish forces to capture Niksitch, Presieka, and Bilek in Herzegovina in September, and Spuz and Antivari in Albania at a later period. —Of the three armies that invaded Turkey in Asia in the spring of 1877, one captured Ardahan by assault; to another Bayazid was abandoned; while the centre invested Kars. The Turks at the same time landed forces in Russian territory, captured Sukhum Kaleh, and excited a revolt among the Circassians. The Russians in Bayazid were besieged by Faik Pasha, and only rescued by a gallant feat of arms performed by Gen. Tergukasoff. In June Mukhtar Pasha, who had been unsuccessful formerly in his Montenegrin campaign, but now had the general command of the Turks in Asia, inflicted severe defeats upon that portion of the Russian centre which had been pushed on to Delibaba and Zevin, and relieved Kars. In the middle of July Gen. Melikoff raised the siege of Kars, and almost the whole of Turkish Armenia was evacuated by the Russians. After receiving reënforcements, they advanced again against Mukhtar, who had been weakened by the loss of troops detached for service in Europe. In the beginning of October there were

several days of fighting in the neighborhood of Kars, ending in a great battle at the Aladjadagh on Oct. 15, and in the almost complete destruction of Mukhtar's army of 35,000 men, of whom about 10,000 were captured. The Deve-Boyun position before Erzerum was taken early the next month. Other Russian operations against the Armenian capital were unsuccessful, but ample compensation was found for this in the capture by assault of the famous stronghold of Kars, on Nov. 18, with 300 guns and 10,000 prisoners. The investment of Erzerum followed.—In Europe, after the fall of Plevna, Gen. Gurko turned the Turkish left flank in the Etropol Balkans, and on Jan. 3, 1878, he occupied Sophia, in whose streets a Christian army was seen for the first time since 1434. The Turkish Balkan army of 32,000 men and 93 guns, defeated at Shipka by Gen. Skobelev, and attacked on the other side by the Russian army issuing from the Shipka pass, surrendered on Jan. 9 to Gen. Radetzky. At the same time Nish surrendered to the Servians. Gurko advanced and occupied Philippopolis, routing and putting to flight Suleiman's army; and on Jan. 20 Radetzky's corps occupied Adrianople without firing a gun. The Turkish government at the beginning of the year had induced England to approach the emperor Alexander with a view to bringing about a truce, and an armistice was concluded between the combatants at Adrianople on Jan. 31. Skobelev, however, continued to advance until his troops were at Tchatalja, in sight of Constantinople. A British fleet thereupon passed the Dardanelles, and England and Russia were at the point of coming to blows. Negotiations proceeded between Turkey and Russia, and a treaty was signed on March 3 at San Stefano, on the sea of Marmora, 12 miles from Constantinople, to which the grand duke Nicholas's headquarters had been removed. It provided for the autonomy of Bulgaria, which province was to include the country between the Danube and the Balkans and the greater part of Thrace and Macedonia, thus stretching from the Black sea to the Archipelago, and was to be controlled for two years by a Russian commission, and to be occupied by 50,000 Russian troops; independence for Montenegro, and the cession to her of such territory as she had conquered; independence for Roumania and Servia, with the cession to the former of the Dobrudja, and to the latter of territory in Bosnia; an autonomous administration for Bosnia and Herzegovina with adequate guarantees, and similar reforms in the other Christian provinces; the cession to Russia of Roumanian Bessarabia, which had been taken from her by the treaty of Paris, and, in lieu of a war indemnity of about \$1,050,000,000, of Batum, Kars, Bayazid, Ardahan, and adjacent territory; absolute freedom of the straits to merchantmen, and prohibition of their passage by men-of-war; and the payment to Russia, for the indemnification of private losses, of about \$200,000 in bonds, the interest

to be guaranteed by the Bulgarian and Egyptian tributaries. Austria and England declared this treaty irreconcilable with their interests, and the former proposed the settlement of the matter by a European congress. England refused to attend unless Russia would engage to submit every clause of the San Stefano treaty, while the latter reserved a veto upon all matters which in her opinion did not fall within European jurisdiction. At this deadlock Lord Beaconsfield ordered a contingent of Indian troops to Malta, and was sustained by parliament when the subject came before that body. The difficulty was solved by a secret agreement between Russia and England, by which the latter agreed to yield to some of the Russian demands in Europe, on condition that no further advance should be made toward the British frontier in Asia. On June 3 Germany issued invitations to the signatories of the treaties of 1856 and 1871 to send to Berlin ambassadors to discuss the treaty of San Stefano. The sitting of the congress began on June 13, and on July 13 the treaty of Berlin was signed. The chief modifications which it effected upon the San Stefano treaty were as follows: Bosnia and Herzegovina were handed over to be occupied and administered by Austria; the territory ceded to Montenegro was cut down on the southeast to a narrow strip with a frontage on the sea of only about 7 miles, about 30 square miles at this point being ceded to Austria; Montenegro was forbidden to have a navy, and her acquired harbor of Antivari was forbidden all ships of war; the territory ceded to Serbia was largely reduced; the tributary principality of Bulgaria was established on the former basis of Serbia and Roumania, but its proportions were so cut down as to extend only from Sophia and Widin on the west to Varna and Silistria on the east, and to include no territory south of the Balkans; south of Bulgaria, and running in a long parallelogram from near the Little Kara-su to the Black sea, was erected the new province of Eastern Roumelia, under the direct political authority of the sultan, who might keep regular but not irregular troops there, but with a Christian governor and native militia; the rectification of the Greek frontier was recommended; the Russian army in European Turkey was to be removed in a year; Batum, though ceded to Russia, was to lose its fortifications; Bayazid was to be restored to Turkey, and the town and valley of Kotur to Persia; difference of religion was not to be an obstacle to political rights anywhere in the Turkish empire. Altogether Turkey lost 83,300 square miles of territory and 4,882,000 inhabitants. About the time of the conclusion of the treaty it was learned that England and Turkey had entered into a secret agreement by which the former engaged to defend her ally's Asiatic territory if ever attacked, and in return received control, though not absolute possession, of Cyprus. Under this treaty an Austrian army marched into Bosnia, but it was

only after a campaign of several months that the Mohammedan insurgents were reduced to submission, and the country pacified. A constituent assembly of Bulgaria at Tirnova in April, 1879, elected for its prince Alexander of Battenberg, a son of Prince Alexander of Hesse and a nephew of the empress of Russia. In May the sultan appointed Prince Alexander Vogorides (Aleko Pasha) governor general of Eastern Roumelia. The Albanians resisted the efforts to rectify the Montenegrin frontier on the south, and Mehemet Ali, who was sent from Constantinople to quiet them, lost his life in a riot. Disorder has continued in this quarter, encouraged, it is generally believed, by the Turkish authorities; and the Porte has also so far evaded coming to any agreement with Greece on the frontier question.—See "War Correspondence of the Daily News" (2 vols., London, 1878); "Armenia and the Campaign of 1877," by C. B. Norman (London, 1878); and "The Russian Army and its Campaigns in Turkey," by F. V. Greene, U. S. A. (New York, 1879).

RUTHERFORD, Lewis Morris, an American inventor, born in Morrisania, N. Y., Nov. 25, 1816. He graduated at Williams college in 1834, studied law, and entered into partnership with Hamilton Fish. He has devoted himself largely to astronomical photography, on which and kindred subjects he has published numerous papers. He has invented a dividing engine, a micrometer for measuring photographs taken with a telescope, and other apparatus for similar purposes.

RYLE, John Charles, an English author, born in Macclesfield in 1816. He was educated at Eton and Oxford, took orders, served as curate of Exbury in the New Forest, and became rector of St. Thomas's, Winchester, in 1843, rector of Helmingham, Suffolk, in 1844, and vicar of Stradbroke in 1861. In 1871 he was made honorary canon of Norwich cathedral. In 1880 he was chosen to be dean of Salisbury (which post he did not take), and the same year was appointed first bishop of the newly established see of Liverpool. Bishop Ryle's publications include "Expository Thoughts on the Gospels" (6 vols.), "Hymns for the Church on Earth," "Coming Events and Present Duties," "The Bishops and Clergy of other Days," "The Christian Leaders of the Last Century," and a large number of "Tracts for the People," which have been translated into most of the continental languages, and have circulated largely in the United States and Canada.

SAINT GOTHARD TUNNEL. This new passage through the Alps was opened for traffic in May, 1882. It presents the straightest and shortest route between central Europe and Italy, and makes Genoa a port for German commerce in the Mediterranean. It was projected as early as 1848, but was not really attempted till after

the consolidation of Italy and the formation of the North German Bund. Great difficulty was experienced in reconciling the conflicting interests of the Swiss cantons, and at one time their dispute seemed likely to result in civil war. The main tunnel is 14,944 metres in length (about $9\frac{1}{4}$ miles), and is the longest in the world. Besides this, there are, in the approaches, 53 shorter tunnels, making a total length of 40,718 metres ($25\frac{1}{4}$ miles). The highest point is 3,693 feet above sea-level; that of the Mont Cenis is 4,043. The St. Gothard has little ventilation, and the temperature in its interior is 88° Fahr. The cost was about \$44,000,000.

SALICYLATE OF SODIUM, a medicine which is prepared by adding salicylic acid to a 10 per cent. solution of caustic soda as long as it is dissolved, filtering, and evaporating to dryness; or 10 parts of pure crystallized carbonate of sodium may be added to 10 parts of salicylic acid, previously mixed with sufficient water to make a thin paste. After the evolution of carbonic acid has ceased, the solution is perfectly neutralized with caustic soda, and evaporated to dryness. Salicylate of sodium is a white powder, having at first a sweet and afterward an acrid taste. It is soluble in about its own weight of cold water. Like salicylic acid, it exerts a powerful influence over acute rheumatism. In the majority of cases, the excruciating pain is very promptly relieved, while the swelling rapidly diminishes. Being much more soluble, it is generally preferred to salicylic acid. It may be given in doses of 20 grains every two hours until the pain abates, or until six doses have been taken; then the dose should be smaller, or be taken at longer intervals. It may be administered in water alone, or in aromatic water, or sirup. When used too long or in too large doses, it may produce roaring of the ears, dimness of vision, delirium, &c.

SANT, James, a British artist, born in Croydon, April 23, 1820. He was a pupil of Varley, and began his career as a portrait painter. His pictures include, besides numerous portraits of celebrated people, "Samuel," "Children of the Wood," "Little Red Ridinghood," "The First Sense of Sorrow," "Turn Again, Whittington," "Light in Dark Places," "Mentonese Children," "The Schoolmaster's Daughter," "The Early Post," "Gleanings," "Little Zara," "The Light of the Cross," "Mother's Hope," "She never Told her Love," "Saxon Women," "The Boy Shakespeare," "The Walk to Emmaus," and "The Miller's Daughter." He became an academician in 1870, and in 1871 principal painter in ordinary to the queen.

SANTLEY, Charles, an English singer, born in Liverpool about 1840. He studied in England and in Italy, and first appeared in opera at Covent Garden in 1860. He took rank from the first as one of the most effective barytones on the stage, and has sung in most of the capitals of Europe, confining himself mainly to Italian opera. In the United States he appeared in 1878 in concerts and in operas.

SAYCE, Archibald Henry, an English philologist, born near Bristol, Sept. 25, 1846. He was educated at Oxford, where he was for some time a tutor, took orders in 1870, and in 1876 became deputy professor of comparative philology and professor of Celtic. He is also a public examiner in the school of theology, and a member of the Old Testament revision company. He has published "An Assyrian Grammar for Comparative Purposes" (1872); "The Principles of Comparative Philology" (1874); "The Astronomy and Astrology of the Babylonians" (1874); "Babylonian Literature" (1877); "Introduction to the Science of Language" (2 vols. 8vo, 1880); and numerous lectures and papers in periodicals. He has also edited George Smith's "History of Babylonia" (1877).

SCHARF, George, an English artist, born in London, Dec. 16, 1820. His father, of the same name, was a Bavarian artist, who emigrated to London and died there in 1860. The son was educated at London university school, and studied art under his father and at the royal academy. He travelled in Italy in 1840, and in 1843 in Asia Minor as draughtsman of a government expedition. He has published "Scenic Effects," a series of etchings illustrating the Shakespearian and classic revivals by Macready, and has illustrated numerous standard books. He has also lectured and written extensively on art subjects, being an authority on historical portraits, among which he has made some notable discoveries, and has prepared elaborate catalogues of several famous collections. There is a large collection of his drawings, Lycian views, and outlines of sculpture, in the British museum.

SCHIRMER, Johann Wilhelm, a German landscape painter, born at Jülich, Sept. 5, 1807, died Sept. 11, 1863. He was a pupil of Schadow. He was the founder of the Düsseldorf landscape school, and the creator of what is called historical landscape. His best works are "Scenes from the Odyssey" and "Biblical Landscapes."

SCHUYLER, Eugene, an American author, born in Ithaca, N. Y., in 1840. He graduated at Yale college in 1859, and at Columbia college law school in 1863. He was appointed consul at Moscow in 1866 and secretary of legation at St. Petersburg in 1869, became a proficient in the Russian language, and made in 1873 a journey in Russian Turkistan, Khokan, and Bokhara, embodying the results in a work entitled "Turkistan" (2 vols., 1876). In 1875 he was appointed consul general and secretary of legation at Constantinople, and in 1876 made a journey through Bulgaria, visiting the scenes of the Turkish atrocities, and making an extended report of his observations to his government. In 1878 he was appointed consul at Birmingham, in 1879 consul at Rome, and in 1880 representative of the United States in Roumania. In 1878 he published "The Cossacks, a Tale of the Caucasus in 1852," translated from the Russian of Count L. Tolstoi; and in 1879 he be-

gan the publication in "Scribner's Monthly" of an extended life of Peter the Great. In 1877 he was elected a corresponding member of the royal geographical society of London, a member of the royal Asiatic society of London, and of the *société asiatique* of Paris.

SCOTT, Julian, an American artist, born in Vermont about 1840. He served with a Vermont regiment in the civil war, and became noted for his charcoal sketches of army life. After the war he opened a studio in New York. His pictures include "Gen. O. B. Willcox in Libby Prison," "The Rear Guard at White Oak Swamp," "Near the Outposts," "Cavalry Charge near Ashby's Gap," "On Board the Hartford," "Reserves Awaiting Orders," "A Camp Raid," "The Duel of Burr and Hamilton," "The Capture of André," and in water-colors "New England Turkey-Shoot," "Changing Guard, 1776," and "On Guard, 1861."

SCOTT-SIDDONS, Mary Frances, an English actress, born in 1848. She is a daughter of Capt. William Siddons, who was a grandson of the actress Mrs. Sarah Siddons. She married Lieut. Scott, a British naval officer, in 1864, and two years later made her first appearance on the stage in Edinburgh, as Juliet. In 1867 she gave readings from Shakespeare in London, and appeared at the Haymarket as Rosalind. In 1868 she gave readings in New York, and entered upon an engagement at the Fifth Avenue theatre. Since that time she has performed in most of the cities of the United States, Australia, and England, appearing mainly in Shakespearean characters, but also as Pauline in "The Lady of Lyons," and as Coralie in "Ordeal by Touch," written for her by Richard Lee.

SEELYE, Julius Hawtrej, an American educator, born in Bethel, Conn., in 1824. His early education was obtained at the school and academy in his native place. He graduated at Amherst college in 1849, and studied theology at Auburn, N. Y., 1849-'52, and at Halle, Germany, 1852-'53. He became pastor of the first Reformed Dutch church in Schenectady, N. Y., in 1853, and remained there till 1858, when he was elected professor of mental and moral philosophy at Amherst college, which chair he still holds (1883). In 1872 he visited India. He became president of Amherst college in 1876. Dr. Seelye has published a translation of Schwegler's "History of Philosophy" (12mo, New York, 1856); "Lectures to Educated Hindus" (Bombay, 1873; republished by the Congregational publishing society, Boston, 1873, under the title, "The Way, the Truth, the Life;," also translated into Hindustani, Japanese, and German); "Christian Missions" (12mo, New York, 1875), and a revision of Hickok's "Moral Science" (12mo, Boston, 1880). President Seelye has also contributed to various reviews, and published sermons and addresses. He was elected to congress in 1874 and 1876, and, though a republican, opposed the electoral commission and the declaration that Mr. Hayes had been elected president.

SERPA-PINTO, Alexander Albert da Rocha, a Portuguese explorer, born in Tendaes, April 20, 1846. He entered the military school in 1858, and received a lieutenant's commission in 1864. In 1869 he served with distinction in the military expedition against the rebellious chief Bonga in the Zambesi region, on which occasion he followed up that river to the Victoria falls. After the close of the campaign he undertook a hunting expedition to the Shiré and Lake Nyassa, passing some time among the Comore and Seychelle, and returning to Europe by way of Goa. His unusual scientific attainments, familiarity with African life, and thorough knowledge of the native idioms, pointed him out as a desirable member of the exploratory expedition sent into the interior of Africa by the Portuguese government. Starting from the Benguela coast in November, 1877, in company with Brito Capello and Robert Ivens, and reaching Bihé in March, 1878, he separated from his companions and made his way across the African continent by a southeasterly route, arriving at Durban April 14, 1879. Serpa-Pinto explored the head waters of the Cubango, which rises in an elevated plateau in the immediate vicinity of the sources of the Cuanza, which flows into the Atlantic, and of the Cuando or Tchobe, the principal affluent of the Zambesi. He reported the discovery in this region of an African race living in the lowest savagery, with tufted hair like the Hottentots, but of white complexion. He ascertained with tolerable certainty that the Cubango, whose waters (as far as they escape evaporation and absorption) enter Lake Ngami, has no connection with the Zambesi, but that the overflow from that lake, when any occurs, passes into an immense salt pan called Macacariari.

SEVEN WONDERS OF THE WORLD, the title of a book (*Περὶ τῶν ἑπτὰ θαυμάτων*) attributed doubtfully to Philo of Byzantium, who lived in the second century before Christ and wrote a treatise on mechanics. This title has passed into a proverbial expression, and much confusion has arisen with regard to its exact meaning. The only known manuscript of the work referred to was carried to Paris from the Vatican library during the reign of Napoleon I. The last chapter is lost, and the preceding one is badly mutilated. It was first edited by Al-latius, with a Latin translation (Rome, 1640). The best edition is Orelli's (Leipsic, 1816). The seven wonders enumerated and described are: 1. The hanging gardens and walls of Babylon. 2. The pyramids of Egypt. 3. The statue of Jupiter, at Athens, by Phidias. 4. The colossus at Rhodes. 5. The pharos of Alexandria. 6. The temple of Diana at Ephesus. 7. The tomb of Mausolus at Halicarnassus. The last chapter of the manuscript treated of the Mausoleum, and the mutilated one of the temple of Diana. In some enumerations, the palace of Cyrus, which was said to be cemented with gold, is substituted for the pharos of Alexan-

dria.—The preceding are sometimes called "the seven wonders of antiquity," as there is another list, known as "the seven wonders of the middle ages." These are: 1. The Coliseum at Rome. 2. The catacombs of Alexandria. 3. The great wall of China. 4. The Druidical temple at Stonehenge, England. 5. The leaning tower of Pisa. 6. The porcelain tower of Nankin. 7. The mosque of St. Sophia at Constantinople.

SHAIRP, John Campbell, a Scottish author, born in Linlithgowshire about 1835. He was educated at Glasgow and Oxford, was an assistant master at Rugby, and in 1868 became principal of the united college of St. Salvador and St. Leonards, at St. Andrews. He has published "Kilmahoe, a Highland Pastoral, with other Poems" (1864); "Studies in Poetry and Philosophy" (1868); "Lectures on Culture and Religion" (1870); "The Poetic Interpretation of Nature" (1877); and a "Life of Burns" (1880).

SHATTUCK, Aaron D., an American painter, born in New Hampshire in 1832. He studied art in Boston, and was for a time a portrait painter, but finally settled in New York. He was elected to the national academy in 1861. His works include "Glimpses of Lake Champlain," "Autumnal Views of Androscoggin Scenery," "Morning Light," "The New Eng-

land Farm," "White Hills in October," "The Old Homestead," "Haying Time," "The Road to Simsbury, Conn.," "Autumn near Stockbridge, Mass.," "Cranberry Pastures," and numerous cattle pieces.

SHAW, Henry W., an American humorist, born in Lanesborough, Mass., in 1818. He removed to the west at an early age, and became a farmer. Afterward for 25 years he was an auctioneer, settling in Poughkeepsie, N. Y. His first production in print appeared in 1863, bearing the pen name of "Josh Billings," by which he has since been known. His writings consist largely of quaint maxims in phonetic spelling, produced in small instalments for a New York weekly paper. He has lectured extensively, and has published four volumes of his sketches, besides an annual "Almanax." A life of him, by Francis S. Smith, was published in New York in 1886.

SHIRLAW, Walter, an American artist, born in Paisley, Scotland, in 1837. His parents emigrated to Chicago when he was a child. He studied in Munich, and settled in New York, where he is now a professor in the art students' league. His pictures include "Toning of the Bell," "Sheep Shearing in the Bavarian Highlands," "Feeding the Poultry," "The Bather," "Good Morning," and "The Young Patrician."

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